

ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

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ANNALS OF SURGERY.

ON SOME POINTS IN THE TECHNIQUE OF RESECTION OF THE RECTUM.¹

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DIRECT surgical interference with diseases of the rectum, as opposed to colotomy, inguinal and lumbar, for the symptomatic relief of these conditions, has become more popular with the profession of late years. In consideration of this, I venture to bring before the Society, this evening, the following case, illustrating the various steps in the operation of resection of the rectum.

Mrs. A. J., aged thirty-seven years, married six years, has had four confinements at full term, and two miscarriages; has never had primary or secondary manifestations of syphilis that she is aware of; she has been ailing more or less since marriage. About three years ago she first noticed a purulent and bloody discharge from the rectum. For the past two years she has been compelled to resort to medicines and enemata to move her bowels, and for the last three weeks before her admission to the hospital her symptoms have been those of almost complete rectal obstruction. On admission to St. Francis's Hospital she was in a very weak and exhausted condition. On introducing my finger into the rectum a callous stricture was felt, beginning about an inch above the anus, into which it was impossible to introduce the examining index. From the vagina, however, a continuation of the callous mass could be readily detected by palpation of its posterior

¹ Read before the New York Surgical Society, October 24, 1894.

wall, giving rather the impression of a tumor that extended upward as far as the finger could reach. In consideration of the catarrh and ulceration, which evidently existed above the stricture in the rectum, and, perhaps, colon, inguinal colotomy was done on the left side, and iodide of potassium administered. On July 25, 1894, several weeks after this preliminary operation, I resected the strictured portion of the rectum, beginning the operation with an osteoplastic resection of the sacrum and coccyx in the knee-elbow posture, according to Rydygier.¹ After elevating the flap and turning it to the right, I incised the soft parts in the posterior median line until the posterior surface of the rectum was reached. The external sphincter was then divided in the same direction, bringing the lower end of the stricture into view. The rectum was then divided transversely immediately below the stricture, and the latter separated from the surrounding tissues. This proved by far the most difficult stage of the entire operation, owing to extended perirectal infiltration. When Douglas's pouch was reached, the end of the stricture also seemed to be near. The peritoneal cavity was freely incised, the gut pulled down, and about four inches of the rectum were removed, that portion really giving more the impression of a tumor than of a simple stricture, owing to the thickness of the rectal walls. The patient, who at the onset was in a bad condition, was now thoroughly collapsed, and I was compelled to finish the operation as quickly as possible. I therefore left the peritoneal wound unsutured, and gave my attention to stitching the stump of the rectum to the small anal portion, which still remained, and to uniting the latter in the posterior median line, where it had been divided at the beginning of the operation, using catgut for the intestine and silkworm for the divided sphincter ani. The osteoplastic flap was not returned to its place, but the entire wound cavity was packed with gauze. Stimulation and intravenous salt-infusions had the effect of rallying the patient after several hours, and her recovery was afterwards uninterrupted. Two months later her condition was as follows: Primary union had occurred throughout the sutured intestine and sphincter, and she has control of the latter; the large wound cavity at the sacrum is almost entirely filled with granulations; the osteoplastic flap has somewhat retracted, leaving two deep wound surfaces still to close, one where the sacrum was divided, and the other to the left of the sacrum; the anterior surface of the sacrum is

¹ Rydygier: *Centralblatt für Chirurgie*, No. 1, 1893.

firmly adherent to the underlying parts. There seems to be a slight stricture at the point of union of the bowel immediately above the anus. I attempted to bring the soft parts together by secondary sutures, on September 15, in which I succeeded, leaving a few openings for drainage, and not having disturbed the bony part of the flap. The artificial anus was closed at the same sitting.

In all resections of the rectum it is a good plan to establish an artificial anus before undertaking the operation itself. I think this adds much to the ease and comfort with which difficult operations on the rectum can be done, while it scarcely increases the element of danger to the patient. I have invariably in this operation incised the gut on the third day after fastening it in the left inguinal region, believing that there is no call for a complete operation at one sitting, when symptoms of acute obstruction are not present. I have followed Maydl¹ in the technique of the operation with but slight modifications. After the usual incision on the left side, I have always attempted to secure that part of the sigmoid flexure lying nearest the descending colon, as recommended by Schede, Lange, and others. A glass rod, covered with iodoform gauze, is then passed through a small hole in the mesentery, immediately below the gut. This, resting on the abdominal walls, acts as a support. A few sutures now fasten the loop to the edges of the parietal peritoneum in the wound, to prevent further prolapse of the intestine, and to bring about adhesions of the two peritoneal surfaces. It is a question of some importance whether we should at this stage bring into exact apposition the intestinal walls, lying between the wound surfaces of the abdominal incision beneath the glass support,—in other words, whether we should assist in the formation of a spur in the cases of temporary artificial anus or not. If we omit to do this, and withdraw the rod on the third day, which, contrary to the custom of others, has been my habit, the gut will very soon retract into the abdominal cavity, and faecal matter will again enter the lower end of the sigmoid flexure and the rectum, sooner than we may desire in the interest of a clean field of operation about the rec-

¹ Centralblatt für Chirurgie, 1888, No. 24.

tum. But if much suturing has been done at this point, and the adhesions have become very firm, closure of the temporary anus may necessitate reopening of the peritoneal cavity and resection of the intestine at the site of the anus. I have been best able to meet both ends by placing four or five catgut sutures, approximating the two ends of the loop, and by removing the support on the third day before incising the gut. The incision should then be made in a longitudinal direction, over the highest point of the loop, with the knife. For this I have never used an anæsthetic. The edges of the incised gut are sutured to the edges of the original incision in the skin, which have been prevented from becoming adherent to the loop by the interposition of several strips of iodoform gauze. I have never seen hæmorrhage of any account during incision of the gut, which has suggested to some the use of the thermo-cautery. The method seems to offer a sufficient guarantee for the escape of all fæcal matter through the artificial anus, although, I confess, that the spur frequently retracts somewhat, but has never in my cases disappeared entirely within the opening in the gut. I do not believe that simple longitudinal incision into the gut, without the formation of a spur on the mesenteric side, answers the purpose of a temporary anus, relying, as we must in such cases, upon the introduction of a tampon to prevent the passage of fæces into the rectum. Aside from the possibility of preventing contamination of the wound surfaces at the time of operation, and especially during the after-treatment, the temporary artificial anus offers another advantage, that of thorough preparation of the patient by irrigation from the rectum. No undue pressure should, however, be used during this manipulation, as peritonitis and death have resulted simply from bimanual palpation of ulcerated carcinomata in the practice of eminent surgeons.

I have never found it necessary in closing such an artificial anus to open the peritoneal cavity. After separating the anus from the skin by a circular incision, and freeing the gut as far as is possible, it is important to excise the cicatricial ring at the opening into the gut before closing the same with a Czerny-Lembert suture. I have used silk and catgut for this, and have no preference. The rest of the wound is closed entirely, no drainage

being necessary. In several instances I have not been able to unite the cut edges of the abdominal muscles, which retract considerably, but in the cases in which this has been possible the result is better, there being no tendency to the formation of hernia at the site of the scar.

The temporary artificial anus insures union of the sutured bowel. I am convinced that it is a very unusual occurrence to get complete union of the resected ends, when no artificial anus has been established. Even if we keep the patient constipated for eight or ten days after operation, faecal matter will in a few days begin to accumulate within the rectum, and cause tension along the line of suture, as a result of which, when the bowels are finally moved, separation to a greater or less extent will be seen to have occurred. This can be avoided in the majority of cases in which inguinal colotomy has preceded the resection. And, although we may have been obliged to make a hurried and imperfect intestinal suture at the close of a long and bloody operation, as in the case reported to-night, we will still have the satisfaction of obtaining primary union of the intestine without the formation of a fistula. And it is generally less troublesome to establish and close an artificial anus than to do secondary operations for sacral fistula,—the result of incomplete union of the resected ends of the rectum.

A point, which has seemed to me worthy of some consideration, is the blood-supply of the rectum in its bearing upon the amount of tissue that we should remove in these operations. After resection of the diseased portion it happens that, on approximating the ends of the bowel, we still find some tension present, to relieve which further dissection of the upper end is necessary. On several occasions, when, after free incision of the peritoneum in Douglas's pouch, this has happened to me, I have been placed before the alternative of either cutting through the superior hæmorrhoidal vessels on both sides or of leaving the tension unrelieved. The situation at that moment is practically the following: We hold the stump of the upper end of the bowel, dissected out from the surrounding tissues. When we attempt to pull it down towards the anal end we encounter a resistance in the meso-rectum at about the point corresponding to the transition

of the sigmoid flexure into the rectum. As soon as we have loosened the bowel at this point, it is remarkable with what ease it will follow on downward traction, more especially when the peritoneum has been incised on both sides of the bowel in the direction of the course of the latter. In doing this I have been repeatedly obliged to sever the two branches of the superior hæmorrhoidal artery, which runs in the meso-rectum from the promontory of sacrum towards the upper part of the rectum. I cannot believe that the cutting off of this blood-supply is a matter of indifference, especially when we take into consideration that the superior hæmorrhoidal is, under the existing conditions, alone responsible for the nutrition of the upper end of the bowel, which is deprived of all collateral circulation from the middle and inferior hæmorrhoidal vessels. Its vitality, moreover, has not been increased by the manipulations necessary to liberate it from the surrounding tissues. It has seemed to me, therefore, that in such cases it is wiser to resect an additional portion of the upper end of the rectum until we are well within the domain of other branches of the inferior mesenteric artery. This is not a difficult task. It is only necessary to incise the peritoneal folds on both sides of the bowel, which are now the main impediment to downward traction, and to separate the rectum with the hand from the anterior surface of the sacrum as far as the promontory, if necessary. The importance of complete relaxation of the sutured ends of the intestine cannot be overestimated. Even when we have attained this end and the rectum lies in the wound cavity without any tension, it later on becomes tense from inflammatory infiltration and perhaps some retraction of the upper end. At the point of resection we are without the guarantee of speedy peritoneal adhesion of the united ends of the bowel. We must depend entirely upon our sutures and the absence of tension for primary union, and how much less will be the chances for it to occur if slight tension already exists at the close of the operation. The part of the bowel most likely to suffer in its nutrition is the posterior distal portion of the upper end. I have a few times observed circumscribed necrosis at this point, which has, however, not interfered with the final complete restoration of the intestinal canal when a temporary anus had been made.

In all my cases of resection I have incised the peritoneal cavity in Douglas's pouch, even when the excised portion of the rectum has not measured more than three inches. The length of the rectum from the sigmoid flexure to the anus is about six and a half inches. Its upper part is covered on its anterior surface with peritoneum. Resections which comprise more than three or four inches of the rectum should, therefore, it seems, open the peritoneal cavity, and still such cases are reported by trustworthy operators in which this has not been the case. Previous obliteration of the cul-de-sac or the express intention of the operator not to open the peritoneum may explain these cases, although I am not aware that other surgeons than Bardenheuer have recommended stripping off of the peritoneal investment of the upper rectum as a distinct or desirable step in resection. As a typical method it seems neither rational nor necessary. It is certainly a rather difficult task, from what has been previously stated, to loosen the upper end of the rectum and the lower end of the sigmoid flexure extraperitoneally to such an extent that approximation of the resected ends becomes possible. In doing this we would have to pass beyond that part of the rectum which is most firmly attached to the sacrum, its upper end. Even if we resect only three or four inches, we must mobilize the sigmoid flexure to approximate without tension. Furthermore, the dangers of infection of the peritoneal cavity are not as great, I believe, as they have been urged to be. With the means at our disposal, suture or drainage of the peritoneum, the iodoform tampon, the temporary artificial anus, and the avoidance of tension, we should be well able to control the possibility of infection. It is my firm belief that conscientious and experienced operators lose very few cases of rectal surgery from this cause.

The practice of separating the diseased portion of the rectum from the surrounding tissues before incision of the gut is a further aid in this direction. As many others, I have also been unable to accomplish this in a satisfactory manner without the use of cutting instruments by simply tearing through the adipose connective tissue, as originally recommended by Bardenheuer. In the majority of cases the resection should begin with this step, but there are instances, as in the case reported, in which the

diseased part lies very near the sphincter, and division of the latter in the posterior median line, therefore, offers certain advantages. I am led in this by the conviction that the sphincter should never be sacrificed if it can be saved. I know that more important voices than my own have pronounced it a matter of no importance whether the muscle is retained or not. This is an opinion which my own personal experience does not warrant me in holding, as I have often become aware of the discomfort and mental distress endured by such patients, whether they belonged to the higher or lower walks of life.

Now, it has on one occasion occurred to me that in attempting to get well beyond the lower limit of the tumor in the rectum I had so far invaded the region of the sphincter and had separated it from the adjacent tissues that I was ultimately compelled to remove it, to do an amputation instead of a resection, as intended. I do not think that I should have fared any better in the case presented this evening. I, therefore, made a median incision through the anus and divided the rectum from its interior surface. Thus two strips of mucous membrane, each half an inch wide, covering the sphincter and firmly adherent to the subjacent tissues, remained at the anal end. The nerve-supply of the muscle was also left intact, the inferior hæmorrhoidal approaching the sphincter from each side, and not being severed by any of the incisions.

I have done Rydygier's preliminary osteoplastic operation nine times in seven patients. Never has necrosis of the resected portion of the coccyx or sacrum followed this procedure, whether the osteoplastic flap has been sutured or left unsutured, and the wound cavity tamponned. The ideal method of resection of the rectum is undoubtedly the one, at the completion of which the rectum and also the flap have been sutured, and an iodoform gauze tampon has been inserted along both sides of the bowel to the cul-de-sac, issuing from the wound cavity beneath the tip of the coccyx. In most cases primary union of the bowel will result throughout if colotomy has been done. But even if it should fail, it is better to have attempted a complete operation, as it is easier to raise the osteoplastic flap a second time than to bring it, when it has once shrunk, back into its original position, so that bony union will result.

THE OPERATIVE RELIEF OF GANGRENE OF
INTESTINE DUE TO OCCLUSION OF THE
MESENTERIC VESSELS.

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CASES of infarction and gangrene of the intestine due to thrombosis or embolism of the mesenteric vessels are not often seen even by the pathologist and have rarely been recognized during life. The subject is not mentioned in any modern text-book except Osler's. I have been unable to find even a suggestion that surgery might be useful in such cases. On the contrary, it is distinctly stated by certain authorities that such cases are beyond the help of surgery; and yet, by a strange chance, two such cases were operated on by me within three weeks.

CASE I.—*Resection of Four Feet of Intestine for Infarction probably due to Thrombosis of the Superior Mesenteric Veins.*—The patient, a man of twenty-five years, entered the Massachusetts General Hospital on July 10, 1894, at 7 P.M. He had had a right inguinal hernia of about the size of an egg for four years, for which he had worn a truss at times. Ten months before entrance the hernia had been caught in the ring and was returned by a physician with considerable difficulty and great pain. Since which time any sudden exertion had caused pain at the site of the rupture, but the hernia had never come down again. He had had pain in the right lower abdomen for the past two weeks. He felt well the day before entrance until the onset of slight pain in the right groin while playing ball. He went home and vomited, but thought that due to smoking. He slept all night and ate breakfast on the morning of the day of entrance to the Hos-

pital. His bowels moved naturally, and he felt well and began work as usual. An hour later he felt pain in the right inguinal region while carrying a box. The pain increasing, he went home and vomited. It became very severe in the right lower abdomen, and at 4 P.M. Dr. Vaughan, of Everett, was called and gave several doses of morphia, but found no evidence of hernia. The patient continued vomiting in the afternoon.

On entrance, at 7 P.M., his general condition was good. Pulse, 56; temperature, 99.8° F. He was well nourished, but pale. He complained of great pain over the whole of the lower abdomen, constant with acute exacerbations. An elongated bunch was felt over the appendix region. There was no distention or tympanites, and the inguinal ring was empty. He hiccupped through the night, but had no nausea or vomiting. The pain continued paroxysmal with intervals of almost entire comfort. It was thought best not to mask symptoms with morphia, and he had an exhausting night with little sleep. At 6 A.M. his pulse was 54, of good quality; a little later his lips grew very pale; at 9 A.M. he was evidently worse and looked badly, but pulse remained at 80. He failed rapidly. The operation was done at eleven o'clock, about twenty-four hours after the first severe pain, with the patient in poor condition, with pulse 140.

No diagnosis was made, but it seemed clear that the case was a very unusual one and a very urgent one. The abdomen was opened in the right linea semilunaris below the level of the umbilicus. On opening the peritoneum a large quantity of bloody fluid escaped. Lying beneath the incision was a knuckle of very dark, gangrenous-looking, small intestine. The inguinal ring was found empty and there was no evidence of inflammation about it. The dark knuckle of gut, consisting of several coils of the jejunum, was lifted out of the abdomen and the cause of the condition searched for. There was no evidence of hernia or any other constriction or of a twist. The intestine was neither dilated nor contracted at any point. The unhealthy portion was deep red and nearly black, having a slight gangrenous odor; its walls were thickened by the presence of dark blood in the tissue. The peritoneal coat was without lustre and so friable that it was easily torn by handling. It was divided from the healthy part by a wide, diffuse shading at both ends. There was no abnormal lengthening or shortening of its mesentery. It was evidently an hæmorrhagic infarction almost gangrenous. There were enlarged glands in the mesentery, and the mesenteric vessels felt

thick and seemed to be plugged. Forty-eight inches of intestine were resected, care being taken that the section should be made in perfectly healthy tissue. It contained no faecal matter, but a quantity of the same bloody fluid that was found in the peritoneal cavity. The mesenteric vessels bled but little. Owing to the doubtful origin of the trouble and the poor condition of the patient, primary suture of the cut ends was not attempted. The mesenteric borders being carefully united, the open intestine was rapidly stitched into the abdominal wound.

The patient was put to bed in very poor condition, being dark-blue in color, with pulse of 160. But he rallied in a few hours. The next day the pulse remained shaky, but there was no vomiting nor abdominal distention. He took milk and lime-water. There was a discharge of foul-smelling black blood from the intestinal opening.

On the second day faecal matter passed from the artificial anus, and in the next few days he improved rapidly. The discharge from the opening in the bowel was of a greenish-yellow color and was very irritating.

In about two weeks after the operation it became evident that he was losing flesh. The discharge from the wound was more irritating and was actually digesting the skin in the region. This latter difficulty, however, was much improved by the use of a constant drip of salt-water over the wound. Under these circumstances it seemed best to close the opening in the bowel at once.

On July 27 I dissected the ends of the bowels free from the wound and stitched them together. The wound held well for a week when an irritating stitch was taken out; this was followed by a leaking out of a small quantity of intestinal fluid. A small fistula remained open at this point, but the patient was much relieved. He gained in flesh and strength and was up and about, controlling the discharge from the fistula with a water-truss. The patient was shown at the Surgical Society. On November 16 the fistula was closed by an intestinal resection. Recovery is complete, there being no impairment of nutrition.

The obscure point in this case is the cause of the plugging of the mesenteric vessels. In this connection we have to consider, on the one hand, the probabilities of the vessels being constricted by some outside pressure, such as a strangulation or twist might cause; and, on the other, their being plugged by

thrombosis or embolism. As to the former alternative there was not the slightest evidence of any condition which could cause such pressure. It is almost inconceivable that even a twist could exist long enough to cause sloughing and then become untwisted after the gut was swollen and œdematous, leaving no trace to be seen at an operation done twenty-four hours after the first symptoms. Besides, the symptoms were progressive, there being no intermission suggestive of a change for the better.

After a careful search I have been unable to find a single case of strangulation or twist where anything like this amount of blood was found either in the intestine or peritoneal cavity. As to the latter alternative, no source of an embolism has been found and no cause for thrombosis can be suggested. The patient is young, has no heart murmurs, no atheromatous condition of the arteries, and denies syphilis. The liver is normal in size. As it was possible at the operation to exclude the known causes for outside pressure, and as it is impossible, with the patient still living, to explore the vascular system, it seems highly probable that the vessels were occluded by a process originating within themselves. Just what that process is must be determined by an expert pathologist, and Dr. Whitney has given the matter his careful consideration.

Pathological Report, by Dr. W. F. Whitney.—The piece of intestine removed was of a livid red color, as was also the attached mesentery, to within about 1 centimetre of the cut ends, where it was paler in color. The thickness of the walls of the intestine, as well of the mesentery, was greatly increased. Measuring in the former 6 millimetres and in the latter 12 millimetres, against a normal thickness of 2.5 millimetres and 2 millimetres respectively. This increase was due to extravasation of blood into the coats of the intestine and in the tissues of the mesentery. The vessels were everywhere distended with dark-red clots.

Upon opening the intestine it was seen crossed by transverse folds (*valvulae conniventes*) throughout its entire length, and contained a moderate amount of dark-red, grumous material.

Microscopic examination showed the veins and arteries both of the intestine and the mesentery filled with blood clots more or less

adherent to the walls of the vessels. As a rule, the blood-corpuscles in the arterial clots were better preserved than those in the veins, and the clots themselves looser and not so intimately connected with the walls. Red blood-corpuscles were everywhere to be seen lying densely packed together throughout the tissues, following the connective-tissue bands, separating the bundles of muscular fibres, and filling the lymph-vessels. In the relatively normal parts at the ends, the connective-tissue spaces were simply distended by fluid (œdema).

Although not so readily detected on account of the blood and its coloring matter, the nuclei of the cells of the intestine stained well, and there was but very little desquamation of the epithelium from the lining of the intestine.

No change could be detected in the walls of the arteries. But in the veins there was an indistinctiveness in the staining of the muscular coat, and some of the smallest radicles in the folds of mucous membrane were filled with large mononucleated cells suggesting their origin from the endothelium. Surrounding many of the smaller veins was a round-cell infiltration. An occasional small lymph-follicle was seen in the submucosa.

Remarks by Dr. Whitney.—From the examination it is evident the piece of intestine removed was a portion of the jejunum, in an extreme degree of hæmorrhagic infarction, with possible necrosis. The cause is probably thrombosis of the mesenteric veins. The reason for this conclusion will be apparent after a consideration of the conditions which bring about infarction of the intestine.

As is well known, in the first place, from the classical experiments of Litten, it can be brought about by closure of the superior mesenteric artery or one of its large branches. It takes place in from twelve to fourteen hours after the vessel is tied. But the back pressure from the veins, although sufficient to suffuse the tissues with blood through the altered capillary walls, is not sufficient to drive the blood back into the artery.

This is borne out by the condition I have found in two cases of thrombosis of that artery. In both of these the vessel was empty beyond the plug, although the intestine was of a dark, purple color and saturated with blood. In this specimen the arteries are filled as well as the veins, and suggests that there was

no hinderance to the entrance of the blood, but that its escape was interfered with.

As I have never had a case of thrombosis of the vein for direct comparison with this, as they are quite rare, reliance will have to be placed on the published description of such cases.

Orth¹ says that the most striking examples of hæmorrhagic infarction of the intestine are to be met with after stoppage of the vein. But he gives no detailed description.

The best accounts are those given by English and French observers, of whom the most recent is Pilliet,² who reports two cases of his own, and six of others. One of his descriptions is as follows :

At the autopsy of a woman, aged seventy-two, who died twelve hours after seizure with severe abdominal pain, etc., the intestines were found markedly distended. A portion of the small intestine consisting of two coils was in marked contrast to the rest by its deep red color. It was moderately dilated and covered with fine flakes of false membrane. Nowhere else was there any trace of peritonitis. The length of this piece was about forty centimetres. The mesentery formed a thick, black, apoplectic cake, twenty millimetres thick.

On section there was seen dilated veins filled with red, partly fibrinous clots, adherent to the walls. Microscopically all the layers of the mesentery as well as the coats of the intestines were infiltrated with blood-corpuscles crowded together. The appearances in the other cases are very similar.

Still more striking is the account given by Fagge.³

It was in the case of a woman, who died a month after delivery in a few hours after the onset of severe abdominal symptoms. The small intestine was an intense purple black color in marked contrast to the rest of the bowel, which was paler than normal. Congested parts limited above and below by a well-defined line, from four inches below the duodenum and terminated about the middle of the small

¹ Lehrbuch de Spec. Pathol. Anat., S. 773.

² See Progrès Médical, 2, O. T. XI, p. 497.

³ Transactions Pathological Society, London, 1876, Vol. XXVII, p. 124.

intestine. The congestion extended a little way into the mesentery. The intestine felt massive and on section its coats appeared œdematous. The internal surface was reddened and covered with shreds of mucous, as if the membrane were being detached. It contained a thin, reddish fluid like that vomited.

Thrombi in the superior mesenteric veins extending into the trunk of the vena porta nearly to the point where it breaks up into its branches. The thrombosis extended into the veins beyond the territory that was congested. At the upper part the thrombus was softened and adherent to the wall of the vein. But within the mesentery the rootlets of the vein were distended to an extreme degree by a clot, which was perfectly solid there and evidently of more recent origin. The femoral veins were plugged with softened thrombi extending high up in the vena cava.

There was no endocarditis, or any evidence of peritonitis, or any cause for internal strangulation found.

The seat of the lesion in all the cases is reported as being in the small intestine, without, however, accurately locating it. The length of gut involved varies from forty millimetres to 100 centimetres in the French cases, and in Fagge's case must have been several feet.

The associated conditions which have been assigned in the recorded cases are marasmus, cirrhosis of the liver, and thrombophlebitis. In Pilliet's two cases he was unable to find any cause, and regards it as originating in bacterial inflammation of the intestine, which started the thrombosis of the veins. His evidence in support of this is, however, not very strong.

In Dr. Elliot's case the possibility of an axial twist of the intestines cannot be denied as a predisposing factor for the thrombosis. But there is not the slightest evidence either at the time of the operation or in the specimen that such a condition had ever taken place. The other associated conditions seem also to have been excluded here, and we are forced, as far as the evidence goes, to the assumption of a primary thrombosis of the mesenteric vein as the cause of the infarction.

CASE II.—*Thrombosis of the Mesenteric Artery; Enterotomy; Death.* Reported by Dr. Elliot.—The patient was a man nearly sev-

enty years old, who was sent to the hospital, June 21, 1894, from the Eye and Ear Infirmary, where he had just been operated on for a cataract. He had had rheumatic fever when a boy. About six months previous to entrance both legs had suddenly become paralyzed and he had only recently recovered their use. Three days before entrance he began to feel a dull pain in the epigastrium which gradually became more intense. At the time of entrance the pain came in severe paroxysms. The bowels had moved on the day he entered the hospital. On examination the abdomen was found distended and the transverse colon could be distinguished. The arteries were atheromatous.

On June 22 there was much nausea but no vomiting. Efforts to move his bowels resulted in three or four small liquid dejections containing blood but very little fecal matter. He continued to suffer severe pain, and the abdomen became more distended. On testing the capacity of the bowel by an enema, it was found to hold about a pint of warm water. The case was supposed to be an obstruction of the intestine (probably cancerous) in the descending colon.

On June 23 the abdomen was opened by an incision in the left linea semilunaris just over the distended colon. Free gas and fecal fluid was found in the peritoneal cavity. The transverse colon was distended and dark in color. The condition of the bowel excited my suspicion that it was not an ordinary intestinal obstruction, but the feeble condition of the patient prevented more extended exploration. The descending colon was opened and stitched into the abdominal wound. The gut was so friable that the stitches cut out, and it was finally held in place by a rubber plate passed into the bowel and pulled tightly up against the abdominal wall. A second abdominal opening was made in the median line through which the peritoneal cavity was washed out, and a glass drain was placed in the pelvis.

The patient was much relieved by the operation and looked well for a few days, but soon failed, and died at the end of a week. At the autopsy no obstruction of the intestine was present, but it was found that three or four inches of the descending colon had become gangrenous and perforated and had caused a general purulent peritonitis.

The gangrenous part of the intestine was examined by Dr. Whitney, and found to have been caused by thrombosis of a branch of the mesenteric artery.

Pathological Report, by Dr. Whitney.—The specimen consisted of a short piece of intestine of a dirty black color, and evidently

somewhat decomposed. The mesentery attached to this was not markedly thickened or infiltrated.

On examination of the vessels a branch of the artery was detected, about five millimetres of which were found reduced in size, and the lumen evidently occluded. The artery behind and in front of this place was empty. Unfortunately, no microscopic examination was made of the intestine.

The microscopic examination of the artery showed the lumen filled by a partly red and partly fibrinous thrombus intimately adherent to the wall of the vessel. The stoppage was not absolutely complete, as at one place there seemed to be a little channel, but there was no evidence of any fresh blood there. The walls of the artery were in general thick, and of the coats the greatest change was in the intima, which was many times above its normal thickness.

The plug was in the trunk of the vessel, not at any bifurcation, nor was any part of it distinctly different from the rest, as would be expected in the case of an embolus. It is therefore to be regarded as a primary thrombosis of the mesenteric artery, to which the thickening of the intima—chronic endarteritis—stands in a causal relation.

Remarks by Dr. Elliot.—Although occlusion of the mesenteric vessels usually causes infarction of the intestine, yet in two of the cases observed by Virchow the mesenteric artery was found obliterated and transformed into a cord without causing any change in the intestine. Tiedemann also mentions a similar case, but he notes the fact that the anastomotic branches were much enlarged. Such a condition is explained by supposing that the obliteration of the artery took place slowly, thus allowing time for the collateral circulation to develop. Litton¹ emphasizes the fact that the occlusion must take place suddenly to cause an infarction.

Autopsies show a wide variation in the extent and character of the intestinal lesions; in certain cases the intestine is black and gangrenous, while in others it is ulcerated or simply congested. Councilman² has lately reported a very important case where partial occlusion of the artery in a weak person caused a

¹ Virchow's Archiv, 63, 1875.

² Boston Medical and Surgical Journal, April 26, 1894.

complete paralysis and consequent distention of the intestine. There were ecchymoses, but no infarction. He remarks that probably sufficient blood-supply remained to preserve the integrity of the vessels, but not enough to provide the necessary enervation. In short, the result of occlusion cannot be definitely predicted, as the allied conditions are subject to such wide variations.

Symptoms.—I have found about 50 reported cases, where the artery was occluded. It should first be stated that in most of these cases there was evidence of heart-disease or atheromatous arteries. Dr. Moyes¹ found the source of the embolus in the left heart in 19 out of 23 cases. In analyzing these cases in order to arrive at a more definite idea of the relative frequency of the local symptoms, it has been necessary to exclude many cases on account of incompleteness in the reports. I have also excluded all the cases where the symptoms of heart-disease have overshadowed the abdominal symptoms and cases where the patients became unconscious early in the disease from other than local causes.

After such exclusion I have tabulated 20 cases. Even these have insufficient data. The following is a list of the principal symptoms :

Number of cases	20
Pain	17
Colicky pain	6
Vomiting	13
Vomiting of blood	3
Bloody stools	13
Profuse hæmorrhage from bowels	6
Obstruction of fæces, but passage of blood	3
No fæces or flatus passed	3
Diarrhœa	9
Abdominal distention	8
Subnormal temperature	3
Tumor in abdomen	3

These cases were rapidly fatal. It appears that pain, often colicky in character, was the most prominent symptom, and it is usually the first. It occurred in almost all of the cases. Vom-

¹ Glasgow Medical Journal, 1880, Vol. XIV.

iting was noted 13 times. The most notable symptom was the presence of blood in the stools, which was recorded in 13 cases. In 6 cases it was described as profuse. In one it was said to be "uncontrollable," in another the patient died of "internal hæmorrhage." The stools were frequently described as consisting of tarry-like blood with a carrion odor. Intestinal hæmorrhage occurs in most of the cases, for when death ensues before it appears in the stools it is usually found in the intestines at the autopsy. In fact, blood in the intestines and in the peritoneal cavity is a most natural result of infarction.

A tumor was noted in three cases. In one case it proved to be a collection of blood in the mesentery, in the other two it was the infarcted bowel.

Subnormal temperature and extreme pallor have been noted in several instances. These symptoms are undoubtedly due either to the hæmorrhage or to peritoneal shock or peritonitis.

The passage of blood is the only distinguishing sign. A typical case may be represented by a patient having heart vegetations or atheromatous arteries, who, without previous digestive disturbance, suddenly develops acute abdominal symptoms with intestinal hæmorrhage. In the cases where the hæmorrhage does not occur, diarrhœa might be suggestive, but if neither blood nor fæces passed it would be almost impossible to distinguish this condition from an acute obstruction, as in the second case reported.

The symptoms may resemble very closely those of intussusception, for in both diseases there is often diarrhœa and intestinal hæmorrhage, as well as pain and vomiting. In distinguishing these two diseases, the presence of heart-disease or any other source or result of embolism would be in favor of embolism of the mesenteric artery; whereas, intussusception is most common in young persons, 56 per cent. occurring under the age of ten. (Fitz.) Although hæmorrhage is common in both, it is more apt to be profuse in the embolic cases. It has been recorded as the principal cause of death in both. Swollen and tympanitic abdomen is rare in the early stages of intussusception, and occurred in nearly half the cases of embolism. A tumor has more

often been found in intussusception, and when found its character would usually settle the diagnosis.

I have found 14 reported cases of thrombosis of the mesenteric veins. These cases were even more rapidly fatal than those just referred to, nearly all having died on the second or third day with symptoms of intestinal obstruction. The different local symptoms were present in about the same proportion of cases as in the table already given for occlusion of the artery. Diarrhœa, however, is not mentioned in a single case. Blood either vomited or passed in large quantities was noted in one-half the cases. One would expect more profuse bleeding from plugging of the vein than of the artery, because with the vein only occluded the artery would still continue pumping blood into the tissue. One case reported by Sir William Gull,¹ due to syphilis, recovered. The patient fell in collapse after a copious hæmorrhage; a few days later he passed per rectum portions of a dozen or more valvulæ conniventes. This is interesting in connection with the post-mortem report of Fagge's case, a part of which reads, "it seemed as though the mucous membrane itself was being detached." In two of the cases a volvulus was considered to be the result of a thrombosis. In five there was cirrhosis of the liver. Two were syphilitic.

Finally, acute abdominal symptoms with passages of blood, in a patient with cirrhosis of the liver or some other obstruction to the portal vein, would be very suggestive of thrombosis of the mesenteric veins.

The *prognosis* is very grave, but the cases of Virchow and Tiedemann, already referred to, show conclusively that the collateral circulation may become established in time to save the intestine. Dr. Moyes quotes a case related by Parenski, where a patient was operated on for stricture of the bowel, and only at the autopsy was it discovered that the stricture was due to cicatrization from ulceration caused by embolism of a branch of the superior mesenteric. According to the same authority there are on record at least three cases of recovery, where occlusion of the main stem of the artery is supposed to have taken place.

¹ Guy's Hospital Report, 1883, xvii, 15.

Treatment.—In general, the heart's action should be stimulated, because the only hope of recovery is in establishing a collateral circulation. In the literature I have found only three cases which have been operated upon. All were done accidentally without a diagnosis, and all with a fatal result.

The first case was by Mr. McCarthy.¹

The patient had symptoms of intestinal obstruction. At the operation no obstruction was found, but the mesenteric vessels were filled with clots. The perforated bowel was stitched to the abdominal wound. Death in ten hours.

The second case was by Kendal Franks.²

A patient with varicose veins and an ulcer of the leg had symptoms of acute intestinal obstruction, violent pains, vomiting. Neither fæces nor flatus passed. At the operation volvulus of a coil of small intestine was found. This coil was gangrenous. Its mesentery was thick and cedematous with all the veins thrombosed. "They felt like cords running through the mesentery, and were evidently not the result of recent disease." Sixteen inches of gut were resected with immediate suture. Death in two days.

The autopsy was made by Dr. Bewley, a pathologist. Part of the bowel below the line of suture had become gangrenous. Not only were the veins throughout a large piece of the mesentery completely occluded by old blood clots, but the same condition existed in the portal vein. An old, firm blood clot was found extending through its whole length, and so filled as to leave only a minute channel beside it for the passage of the blood. He was unable to ascertain the cause or origin of this state of the veins, but in his opinion it was unquestionably the primary cause of the gangrene of the gut, the volvulus being secondary.

Aside from the surgical interest, this case is one of the few in which the veins and not the artery were found plugged. The intestinal lesion and consequent symptoms were the same as in the cases where the artery alone was occluded.

The condition of the intestine which the surgeon will meet varies, as we have seen, from that of gangrene to a condition of

¹ Lancet, 1890, p. 646.

² Transactions Royal Academy of Medicine in Ireland, Vol. xi, 1893, p. 8245.

simple congestion or paralysis with dilatation. Of course, resection is the only operation to be thought of in case gangrene is present. It is equally clear that enterotomy is indicated in cases of paralysis with dilatation. The cases between these two extremes should be treated by resection or enterotomy according as the appearance of the gut seems to indicate danger of degeneration or a good chance of recovery. In short, it is the same question which arises in every operation for strangulated hernia. Is the condition of the gut beyond repair? Prompt laparotomy should be done for the profuse hæmorrhage, provided the diagnosis is moderately certain. In these resections care should be taken to go well outside the disease. As we have seen, failure to do so caused death in Franks's case.

As such a pathological condition may require extensive resection (as in the case here reported), let us consider for a moment the question of how much intestine can be resected without impairment of the general nutrition.

(1) The longest piece ever resected is two metres eight centimetres, by Kocher, for a railway injury. The ends were united by primary suture. The patient remained well with the exception of having a diarrhœa, which was easily started by any error in diet.

(2) Koeberle¹ resected two metres three centimetres for multiple strictures. He stitched the cut ends into the abdominal wound, which closed in six weeks. The patient did not show lack of nutrition.

(3) Kocher² resected 160 centimetres for strangulated hernia, primary suture. Patient died three years later of another disease.

(4) Schlange³ resected 135 centimetres for internal strangulation. The patient was in good health two years later.

(5) Braun⁴ resected 137 centimetres for umbilical hernia. Immediate suture. Patient died four months later of inanition.

In the case here reported, 124 centimetres were resected, and it is the sixth longest successful resection ever done.

¹ Bull. de l'Acad. de Méd., 1881, No. 4.

² Correspond. Blatt f. schweize Aertze, 1886, No. 5.

³ Berliner klinische Wochenschrift, 1892, Band XLVII.

⁴ Centralblatt für Chirurgie, 1885, No. 7.

From experiments on dogs, Senn concluded: "In all cases of extensive resection of the small intestines where the resected portion exceeded one-half of the length of this portion of the intestinal tract, where the animals survived the operation, marasmus followed as a constant result, although the animals consumed large quantities of food. In all these cases defective digestion and absorption could be directly attributed to a degree of shortening of the digestive canal incompatible with normal digestion and absorption." He further states that in dogs and cats the excision of more than one-third of the length of the small intestine is dangerous to life.

Grzebicky¹ found that animals after extensive intestinal resection always lose in weight at first, but gain later. After many experiments and an exhaustive discussion of the subject, he concludes that a resection of 286 centimetres in man is perfectly feasible.

There is no doubt that immediate suture of the cut ends is the best method, but the doubtful condition of the gut and the strength of the patient must be considered. In general, however, taking a few inches more of intestine adds very little to the danger, and little time is gained by sewing the gut to the abdominal wound.

IN CONCLUSION.

As occlusion of the mesenteric vessels is usually associated with heart-disease or atheromatous arteries or cirrhosis of the liver, we must not expect much from operative treatment. Nevertheless, patients with symptoms of intestinal obstruction cannot be left unrelieved. We have yet much to learn about thrombosis, and there are on record a few cases in which the origin of the process could not be satisfactorily explained, and in which there was no serious complication which would make an operation unfavorable. Pilliet's theory that a bacterial inflammation in the intestine may start a thrombus in the veins is the most encouraging suggestion we have met. Possibly more cases will appear with purely local lesions. If so, this condition seems to me to offer a chance for an occasional surgical success.

¹ Archiv für klinische Chirurgie, 1894, Heft 1, p. 34.

THROMBOSIS OF THE MESENTERIC VEINS AS A CAUSE OF DEATH AFTER SPLENECTOMY.¹

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I DO not intend in this paper to review the literature of the surgery of the spleen, but desire to call attention to one of the rare and unavoidable complications which may happen in the after-course of a case of splenectomy.

In connection with the case about to be reported, a reference to the circulation in the spleen is essential.

The spleen, situated in the left hypochondriac region, receives its blood-supply through the splenic artery, the largest branch of the celiac axis. The return circulation is through the splenic vein, which commences by five or six branches emerging separately from the hilus of the spleen, and passes from left to right beneath the pancreas and joins with the superior mesenteric vein, at nearly a right angle, to form the hepatic vein.

The splenic usually receives the inferior mesenteric vein before the junction, but the inferior mesenteric may join the splenic just at the angle of junction with the superior mesenteric or may empty directly into the superior mesenteric vein.

The latter was the method of union in the following case :

J. C., aged thirty-one ; married ; Norwegian. When she was but four years old a swelling in her left side was noticed. This gradually increased in size, but was unaccompanied by pain or other symptoms. Patient had been married nine years and never pregnant until 1892. No specific or rheumatic history acknowledged.

In June, 1893, she had a hæmorrhage from the stomach and

¹ Read before the Brooklyn Surgical Society, November 15, 1894.

bowels. Three months later this was repeated, and January 1, 1894, it was repeated a third time, a fourth in March, and a fifth in June, the intervals gradually decreasing. During this time she became very anæmic and lost flesh and strength. Coincident with the first hæmorrhage the abdominal tumor began to enlarge gradually. Pain was not at any time a feature, but the increased size of the tumor gave her considerable discomfort.

On admission to the Norwegian Hospital, July 18, 1894, she was much emaciated; temperature 100° F.; pulse 96; appetite fair; and sleep normal. Physical examination of heart and lungs was negative.

Inspection of the abdomen revealed a distinct projection in the left side extending from the free border of the ribs to the crest of the ilium. By palpation a tumor, firm in consistence, not tender, and quite movable, was found to occupy the site of the swelling.

Treatment was at once directed to the anæmia, and iron, combined with quinine and strychnine, was administered, together with inhalations of compound oxygen four times a day.

Examination of the blood by Dr. de Forest. Red corpuscles, 3,568,000; white corpuscles, 7000; hæmoglobin, 45 per cent.

The patient improved somewhat under this treatment and gained in strength and color.

On August 17 another examination of the blood was made, with the following results: Red blood-corpuscles, 3,464,000; white blood-corpuscles, 4000; hæmoglobin, 50 per cent.

The diagnosis of simple hypertrophied spleen having been made, and leukæmia excluded, and the patient fearing a repetition of the hæmorrhages, an operation for extirpation of the organ was determined upon.

On August 22, 1894, with the assistance of Drs. Wood and Cameron and the members of the house-staff, the operation was performed. An incision five inches long was made along the edge of the left rectus with the centre about opposite the umbilicus. On opening the peritoneum the spleen immediately came to view. No adhesions were found except at the upper angle; further examination, however, showed that the organ had been rotated on its long axis so that the hilus was to the outer side and the vessels passed beneath the spleen before entering it. This rotation was easily overcome and the spleen then readily brought up into the wound. A larger clamp was placed across the vessels and the spleen cut away. The stump was

then secured by ligatures in three sections, and the abdominal wound was closed by crossed sutures of silkworm-gut and a subcuticular silk suture of the skin.

The operation lasted forty minutes; practically no blood was lost, save what came from the spleen, and no shock followed.

The after-treatment, as far as the wound was concerned, was practically without incident, the subcuticular suture was removed on the tenth day, and the deep sutures on the eighteenth.

Although the wound did not give any anxiety, a series of rapidly succeeding complications developed and apparently changed the result of the case.

On the second day after operation the temperature suddenly reached $103\frac{2}{3}^{\circ}$ F., and the physical signs of pneumonia of the left lung began to appear.

Under appropriate treatment defervescence began on the tenth day, and on the fifteenth day the temperature was normal.

On the next day, September 6, the temperature again rose to $103\frac{2}{3}^{\circ}$ F., respiration 44, and the signs of a right-sided pneumonia appeared. With this there was also a moderate diarrhoea.

September 8. Temperature still continued high and diarrhoea did not yield to treatment.

September 10. Physical signs of fluid in the right chest present, but aspiration failed to detect fluid.

September 12. Morning temperature, normal; evening, 100° F.; pulse, 94; respiration, 24. Patient quite bright and desired to sit up. Diarrhoea still continued.

September 14. Patient cheerful and free from distress of all kinds. Suddenly, about 11.30 in the morning, vomiting began, severe pain developed in the abdomen, temperature rose to 104° F., and patient collapsed, the pulse being imperceptible. During the afternoon and evening vomiting continued, and tympanitis began to develop. She continued to fail, and at 10.30 A.M., September 15, she died, just twenty-four days after operation.

Autopsy.—Wound of operation firmly healed.

Thorax.—Left lung shows a few old pleuritic adhesions and is slightly œdematous.

Right lung is bound down to chest-wall, over its entire extent, by both old and new adhesions. Over the diaphragm is a cavity, between lung and muscle, containing a small quantity of serum. The lung itself shows a partially-resolved lobar pneumonia of its lower lobe,

with some evidence of beginning areas of gangrene. The upper lobe is normal.

Heart.—Pale, contracted; valves normal.

Abdomen.—The cavity contains a pint or so of blood-stained serum, and the folds of small intestine which present at the incision are dark-purple, congested, and resemble gut which has been strangulated. There are a few omental adhesions in the left hypochondriac region, but no other adhesions. The peritoneal surface beneath the skin wound is smooth and the line of operative wound can be made out with difficulty. This congested portion of intestine is about the entire middle third of the small intestine. The line of demarcation between normal and congested gut is not sharply defined, and extends with varying intensity around the gut.

The spleen is absent. At the stump, from which it was removed, the silk sutures are still in place, and there is no evidence of the slightest sepsis at this point. The splenic veins are greatly distended, tortuous, and filled for the entire extent with a firm thrombus, which extends into the portal vein and occludes the mouths of the mesenteric veins.

Examination of the Spleen.—Weight, 2240 grammes (nearly five pounds) after being drained of its blood (normal weight, seven ounces). Microscopic examination shows chronic hypertrophy with hyperplasia of the connective tissue.

The points of interest to be noted in this case are the following:

(1) The early appearance and the slow growth of the tumor for twenty-six years.

(2) The sudden increase of size attended with profuse and alarming hæmorrhages from the stomach and bowels. The rotation of the spleen on its vertical axis may have taken place at this time, and the circulatory disturbances produced by this would account for the increase of the size of the spleen. In the same way the hæmorrhages from the stomach and bowels may have resulted from venous stasis.

(3) The blood changes showed only simple anæmia. Care was taken to prove that the hypertrophy of the spleen was not an accessory lesion of leukæmia, for, in this condition, it has been shown that the operation of splenectomy is nearly, if not always, attended with a fatal termination.

(4) The slight development of shock after operation is in contrast with many reported cases. Hæmorrhage gave no anxiety during the operation; this is one of the causes of a fatal issue in many of the reported cases.

(5) Notwithstanding the severity of the operation, and the generally reduced condition of the patient, she recovered completely from a left pneumonia and a right was well advanced in resolution.

(6) The sudden collapse and death, and the apparent cause of these, are points to be especially noted. The cause of the sudden collapse seems to be without doubt the shutting off of the return circulation from a large portion of the intestine. The symptoms were almost precisely those of acute intestinal obstruction from band, where a large portion of the gut is strangulated. Collapse was almost the first symptom, a rapid rise of temperature to 104° F. from 99° F. being simultaneous with the development of collapse. The diarrhœa, which persisted for several days, was probably due to a moderate congestion of a portion of the gut.

Why the clot should extend along the splenic vein so far that it could obstruct the superior mesenteric, and why this did not develop before the end of three weeks, are matters for very serious consideration. Was there a phlebitis set up by the ligation of the veins *en masse*, and would this have been avoided by separately tying the ligatures? This may have had some effect, but it hardly seems probable, as it did not appear until so late a date.

The most probable cause seems to me to be that the persistent temperature attendant on the double pneumonia, in a patient whose blood was already altered in quality, so changed the blood that coagulation was easily induced. We must remember in this connection that the clot, at the inner extremity of the splenic just at the junction with the mesenteric vein, was recent as compared with that found nearer the ligatures.

This condition, by whatever induced, seems to be unavoidable, and a complication always to be borne in mind in giving a prognosis in a case of proposed splenectomy.

CASE OF EXTRAPERITONEAL URETERO-LITHOT-
OMY, FOLLOWING NEPHRO-LITHOTOMY
AND NEPHRECTOMY.¹

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THERE are so many industrious workers in all the special and general departments of surgery that the aspirant for new honors must find it extremely difficult to extend his researches into fields that have not already been explored. For a long time hidden in regions that were considered inaccessible, the ureter had escaped the keen eye of the aggressive surgeon; but during the last four years experimental work in the laboratory has appeared to warrant methods of repair for damaged tubes that have been taken advantage of by operators in this country and in Europe. Some points of a practical character have been demonstrated by the anatomical investigations of Cabot, of Boston, and the exhaustive article, by Christian Fenger,² of Chicago, leaves nothing to be said; it is a concise and masterly *résumé* of everything that has been written upon the subject.

Referring to the five reported cases of extraperitoneal ureterotomy, by Twynam, Cabot, Rolfe, Godlee, Kirkham, and the author of the paper, in four of these cases the calculus was reached through a lumbar incision; in three of these the stone was found two inches below the kidney; in Kirkham's case the situation was one-half inch above crossing of external iliac artery; in Twynam's case the combined operation was used; in my own case the calculus was found in what M. Le Dentu speaks of as the inaccessible region.

¹ Read before the New York Surgical Society, November 14, 1894.

² ANNALS OF SURGERY, Vol. XX, No. 3.

Case of Nephro-Lithotomy supplemented by Nephrectomy and Extraperitoneal Uretero-Lithotomy.—The patient, a man forty-nine years of age, entered the Presbyterian Hospital, in the city of New York, January, 1894. From the age of five years he had been the subject of attacks which consisted of excruciating pain referred to the region of the left kidney behind. The pain would begin slowly, but would gradually increase in severity until the acme was reached in about ten hours. Then of a sudden the pain would leave him, his bladder would instantly fill up, and he would pass sixteen to eighteen ounces of urine. The relief was almost instantaneous, for in a very few minutes he would feel perfectly well, and attend to any duty, or engage in any sort of sport. Attacks precisely similar to these in character occurred throughout the patient's life at varying intervals, in spite of various methods of treatment. The intervals between the attacks would at times be of several months, at times only of a few weeks, there being no regularity whatever in their occurrence. Between the attacks the patient was always entirely free from pain. He thinks he remembers to have had some blood in his urine once or twice, but is not certain.

At the age of forty-five he sought operative treatment. This was four years ago, and a lumbar nephrotomy was performed upon him in one of our city hospitals. A dilated kidney was cut into, and its contents evacuated, but no stone was found.

Five weeks after the operation the old pain returned, precisely similar in character to that previously suffered from. These attacks he has had about every two weeks since then, and they are only partially controlled by large doses of morphine.

The patient was loth to submit himself to any further operative procedures, until after six months of increased suffering, when he finally consented to an exploratory operation.

January 3, 1894. Nephro-lithotomy was done. The kidney was exposed by a vertical lumbar incision. It was surrounded on all sides by dense adhesions, posteriorly especially they were extremely firm; sweeping over the anterior surface the finger broke through the remaining thin shell of kidney tissue into a large pus cavity. In fact, the organ was converted into a large abscess, the pus was evacuated, and the finger came in contact with a calculus, which was removed without any difficulty; it appeared to have been formed by the coalescence of four distinct concretions; it measured three and three-quarters inches in its largest circumference, and weighed 115 grains;

some of the dilated sac was cut away, and the wound which was left open was packed with gauze.

The relief afforded by this operation was by no means complete. He still continued to suffer from some of his old pains. The wound refused to heal, degenerating into a fistula that discharged quite a considerable amount of urine, and he was advised and consented to an operation for the removal of the kidney.

Nephrectomy was accordingly done May 6. Anticipating that considerable difficulty would be encountered in operating through the cicatricial tissue following the previous operations, a liberal vertical and obliquely transverse incision was used, the confluence of these incisions enclosing the sinus that led down to the kidney. It required a very careful and tedious dissection to separate it from the colon and peritoneum, but the enucleation was finally complete. The artery and vein were tied together; the ureter was secured by a separate ligature. This, of course, might have been dispensed with entirely, and was only used to diminish the danger of wound infection. The cavity was filled with iodoform gauze, which was not removed until the fifth day. Recovery was uneventful; the ligatures which had been left long came away in about three weeks; he was entirely relieved of his backache, but a new set of symptoms presented, or, probably, it would be more correct to say that symptoms which had been in some degree masked by the more prominent ones associated with the kidney concentrated themselves in the area presided over by the distribution of the genito-crural nerve; he complained of more or less persistent pain about two inches to the left of the median line, and the same distance above Poupart's ligament, radiating from that point towards the inguinal canal, the testis, and the glans.

On my return from a vacation, early in September, I found that these pains were more severe and constant; and that there was a sensitive area above Poupart's ligament. Apprehending the presence of calculus, I advised him to submit to an examination under ether, and such operation as the conditions might indicate. Accordingly on September 5 he was again etherized. Examination of the interior of the bladder proved that viscus to be free from trouble; rectal exploration revealed a small hard mass in the situation of the left seminal vesicle; nothing could be felt through the abdominal walls.

An incision was made four inches in length along the outer border of the left rectus; it was possible through this to explore the ureter from its origin in the ileo-costal space to the base of the blad-

der. This was done with orderly precision, but for some time the examination failed to reveal anything; there was noticed some little bulging of the inner aspect of the bony wall close to the brim of the pelvis, but it was believed to be the brim itself, and only after closer examination was it determined to be a mass which was separable from and situate immediately below the brim; a more careful scrutiny made out its true character; it was fixed immovably in its position, dense in structure, about the size and shape of an almond shell, and felt as if composed of two separate masses, one a larger one that yielded slightly to the pressure of the finger, and a smaller mass of the hardness of stone.

An assistant was now requested to examine for the mass in the rectum, and it could no longer be felt. There could be no possible connection between the mass found on section and that discovered at the base of the bladder. There was quite an interval of space between the two, and what became of the former must remain open to conjecture.

The outer portion of the peritoneum was then stripped from the fossa, laying bare the iliac vessels, and exposing the dilated and thickened ureter. This was carefully opened by an incision one inch long, and the stone was easily removed from its bed. It proved to be an oval oxalate-of-lime calculus measuring in its longest diameter two inches, and in its shortest circumference one inch and a half, and weighing fifty-four grains.

A flexible catheter was now passed into the bladder a distance of less than four, and upward to the renal end of the ureter a distance of more than four inches. The edges of the peritoneum were then carefully united by suture. A few deep sutures were introduced at either end of the wound in the abdominal walls, and the cavity leading down to the wound in the ureter was lightly packed with iodoform gauze. The after-history was uneventful; there was but little elevation of temperature, the wound closed rapidly, and the patient was discharged from the hospital entirely well in the early part of October.

In this case the presence of ureteral calculus was not possible to be made out at first. The symptoms were masked by the presence of a calculus in the pelvis of the kidney; and even after the elimination of that factor symptoms continued, which were ascribed to the presence of the disorganized kidney itself. It was

only after the removal of this that the symptoms of a foreign body in the ureter stood out in unmistakable relief,—that is, pain in the inguinal region, in the glans, and in the testis, and some tenderness two inches from the median line, and about the same distance above Poupart's ligament. As far as the canal itself could be traced, nothing could be found; sounding the bladder was negative; examination of the rectum found some induration in the site of one vesicle, but the operation determined that to be independent of the real seat of trouble. Nothing could have thrown further light upon the case, or could have enabled us to act intelligently, but the abdominal section, and I feel sure that even had we known precisely where the stone lay, we could not have removed it without great difficulty by any other means, situate as it was immediately below the brim of the pelvis, and almost immovably fixed, the fingers of an assistant acting from below were required to push it up into sufficient prominence to facilitate the process of enucleation.

I think that diagnosticating the existence of a calculus, and its location in the ureter is in many cases an exceedingly difficult matter; of course, when there is present the characteristic colicky pain, with a sensitive spot in the loin, and possibly a tumor that can be made out by bimanual palpation, there can be no doubt, but where the calculus is in the more inaccessible portion of the ureter, between the brim of the pelvis and the bladder, the difficulties increase. Calculi engaged in or near the orifices of the ureters, where they terminate in the bladder, may often be made out by the sound, or by rectal or vaginal examination, and may be safely removed through suprapubic openings in the bladder, or through the vault of the vagina; it is that portion of the ureter outside of this region and yet below the pelvic brim that has been considered out of reach, and for these Cabot has devised a modification of Kraske's sacral resection, which he has tried on the cadaver, and has found amply sufficient for the exposure of that portion of the ureter that cannot be reached through the usual routes; in any case it is advisable to do the extraperitoneal operation, especially is this proper when the ureter communicates with a more or less diseased kidney. Under such conditions a

transperitoneal operation would probably have a fatal issue, but a combination of the two methods, section of the abdominal walls for diagnosis, and then stripping up the peritoneum sufficiently to expose the part to be operated upon, with careful suture of the peritoneum, and an open wound leading down to the ureteral incision, appears to me as the ideal method to reach such cases as the one I have related.

CLINICAL REPORT.

- I. COMPLETE SECTION OF THE VAS DEFERENS, END-TO-END UNION.
- II. ACUTE SUPPURATION OF KNEE-JOINT; OPEN TREATMENT.
- III. GASTRO-ENTEROSTOMY BY THE MURPHY BUTTON; ANASTOMOSES BY THIS METHOD.

By WILLIAM J. MAYO, M.D.,

AND

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CASE I. *Complete Section of the Vas Deferens; End-to-End Union by a Simple Method which might be applied to a Divided Ureter.*

M. E. N., Norwegian, male, aged twenty-two, was admitted to St. Mary's Hospital July 27, 1894, with the following history: Patient had suffered for three years from a large varicocele of the left side. Six weeks before admission he received a severe kick in which the tissues of the cord were badly injured.

When admitted there was a painful enlargement of considerable size, involving the whole of the structure of the cord separated by a space of an inch from the testicle below, which was somewhat enlarged. Operation, July 30, 1894. Free incision revealed a mass of injured veins with an acute angle in the vas deferens, which had been lacerated and was occluded. Complete resection of the cord was made, including one and a half inches of the vas deferens. The cord, exclusive of the vas deferens, was treated by ligation of the stumps with catgut and knotting of the ligatures together, thus raising the testicle to a higher level. A round intestine-needle was then threaded

with a strand of number four catgut, and pushed into the lumen of the lower end of the severed vas deferens about three-fourths of an inch, and turned out through its wall laterally, drawing the catgut through. The needle was unthreaded and rethreaded upon the opposite end of the catgut, and this was carried up the upper end of the vas deferens three-fourths of an inch, and turned out through its lateral wall. The two ends of the divided vas deferens were now slipped together along this internal splint like beads on a string until they met end to end. Knots were tied on the catgut at each point of emergence from the vas deferens to form a shoulder and prevent slipping with separation. The wound was closed without drainage, and healed promptly. Patient was discharged in eighteen days, with testicle in normal condition. Re-examined one month later, and result found perfect.

The union of a divided vas deferens has seldom been successfully accomplished, and the conditions to be confronted are very similar to the union of a divided ureter.

The use of an absorbable internal splint like catgut, which does not completely fill its lumen and cause obstruction, has much to commend it, being simple and easy of execution, bringing the ends together without shortening, and in their normal relations.

In making the suggestion that this method might be carried out in a divided ureter, we are well aware that by the labors of Fenger, Van Hook, Küster, and Kelly we have several good methods of securing union of a divided ureter. The ingenious and most excellent method of Van Hook, which has the largest application, causes some shortening, and where a portion of the ureter had been removed might be impossible. In the brilliant case reported by Howard Kelly the ureter was much dilated, and was especially suited to this method, which under normal conditions is not always easy to carry out. The use of catgut, after the method described for union of the vas deferens, might be of service where other methods could not be accomplished, and would not sufficiently occlude the ureter to prevent free passage downward of urine, or it could be reinforced by external suture. Even should the union be but partial, and leakage take

place, the experience of Fenger in leaving an incised ureter without suture to heal by granulation, and securing union without stricture, is certainly encouraging, and provision could be made for drainage, if necessary.

CASE II. *Acute Suppuration of the Knee-Joint; Treatment by Transverse Anterior Incision, Partial Dislocation and Dry-Gauze Packing.*—J. S., Bohemian, aged eight, was admitted to St. Mary's Hospital, July 22, 1894, with the following history: Three and a half weeks before admission the boy was accidentally wounded in the outer and upper part of the right knee by a scythe in the hands of his father. This injury was rapidly followed by fever and chills, and well-marked septic symptoms, and the thigh became very much swollen. Several abscesses in the neighborhood of the joint had been opened by the attending physician.

When admitted his condition was profoundly septic. Pulse 140; temperature 104° F. He was more or less delirious, and suffering great pain. The knee was swollen, and on pressure exuded pus at the site of the original puncture. There was a huge abscess in the thigh extending from the external condyle to the great trochanter, and one equally as large extended from the head of the tibia to the internal malleolus. In the face of such grave septicæmia amputation at the thigh seemed to promise the only hope.

July 23. Under ether anæsthesia a transverse incision was made across the anterior face of the joint, cutting the patella with a heavy knife, and opening the joint as for an excision. The tibia was partially dislocated forward, and the leg was flexed on the thigh, and a thorough gauze packing of the cavity was done. The upper and lower abscess cavities were treated by free incision and gauze packing.

After History.—The temperature and pulse rapidly fell to the normal. The wounds were treated by the dry-gauze packing, and when the joint was filled with protective granulations the bones were restored to their normal position and allowed to heal by granulation, with resulting cure in two months; the knee becoming firmly ankylosed.

Surgeons in hospital practice frequently meet with neglected cases of joint suppuration in which recovery with a movable joint is out of the question, and too frequently amputation must be resorted to as a life-saving measure.

Dividing the knee-joint cavity into spaces and treating supuration by from four to six drainage-tubes, as recommended by Andrews and Gerster, suffice for some cases, and may be supplemented by a tube-drain through the popliteal space, as practised by Hartley and others, while Frederick Dennis and Roswell Park report cases successfully treated by continuous irrigation or immersion in weak antiseptic fluids, but in a considerable number of cases amputation or death results. The knee-joint cavity is a large lymph-space and absorption is most active and general sepsis is quickly produced, while the nature of the cavity is such as to prevent thorough drainage so long as the joint surfaces are left in contact.

Free exposure by the ordinary incisions for excisions permits of the thorough application of dry-gauze packing and complete obliteration of the pockets.

CASE III.—*Gastro-Enterostomy by Means of the "Murphy Button," with Table of Late Cases of Anastomoses by this Method.*—A. A., Norwegian, male, aged seventy, was admitted to St. Mary's Hospital, August 2, 1894, with the following history: Patient had been an unusually robust man until three months before admission; he then began to suffer from a moderate amount of gastric distress, but not of serious nature until one month previous when he began vomiting, at first food, later a coffee-ground material; his bowels were obstinately constipated, emaciation being rapid from that time.

On examination, patient was found to have a chronic bronchitis with considerable expectoration. There was no tumor discoverable in the region of the stomach. Irrigation of the stomach gave no information further than that the stomach was markedly dilated. The vomit consisted of food taken, and partially digested blood. Examination of test meals showed the reaction to be feebly acid. Urine contained neither albumen nor peptones. August 4, 1894.—The stomach was carefully washed out and ether administered. A transverse incision five inches in length was made and a cancerous obstruction of the pylorus was brought into view; enlarged glands could be plainly felt behind the malignant mass, and pylorotomy, which had been contemplated, was out of the question. The jejunum was then brought up and gastro-enterostomy performed by means of the large-

size Murphy button and the incision closed. The time consumed was twenty minutes.

In spite of the fact that the stomach was supposed to be empty, vomiting took place during the anæsthesia, and some of the vomit was aspirated into the bronchial tubes. The patient was removed from the table breathing badly and requiring artificial respiration for some minutes.

After History.—Patient was nourished by rectal alimentation for three days; vomiting of grumous material took place occasionally for thirty-six hours, then ceased and did not return. After the third day he was fed by the mouth in gradually-increasing quantities; his bowels acted daily, and the relief was great, until death took place two weeks later. At no time did the abdominal condition give rise to anxiety, the wound healing promptly. The bronchitis developed into a well-marked aspiration pneumonia and death followed from this cause at the end of the second week. A post-mortem examination, made by Dr. Christopher Graham, pathologist to the hospital, revealed in the lungs the small and large bronchial tubes filled with purulent material, and pus exuded on section from numerous small abscesses.

Abdomen.—Incision healed. Carcinoma of pylorus completely obstructing its lumen with enlarged glands in the mesentery and lesser omentum. The gastro-intestinal union was so perfect as to appear like a normal opening; on separation the line of union was firm, and but little, if any, thicker than the intestinal wall. The opening was clean cut and the different coats seemed to unite with little intervening cicatricial tissue, and, to our surprise, the opening was much larger than the button. The button was free, and while not yet passed was causing no obstruction, and would undoubtedly soon have been evacuated.

It is possible that the fatal broncho-pneumonia could have been prevented by chloroform anæsthesia, but certainly the result was a triumph for the button. Nearly a year and one-half ago we made a cholecystoenterostomy by means of the Murphy button in a man seventy-one years of age for relief of complete obstruction of the common duct; the patient is alive and well at the present time. The ease, rapidity, and certainty with which the anastomosis was effected in these two cases have convinced us of the practical utility of this remarkable device. Through the kindness of Dr

Murphy we append herewith a tabulated statement of anastomoses made by means of the button since the complete list published in the *Medical Record*, May and June, 1894. It will be noted that in one of the fatal cases reported, where the stomach wall slipped out of the grasp of the button and leakage took place, that the smallest size button was used, which is not intended for this purpose, and is too small to grasp and hold the tissues. In addition to the list of cases published are a number which have not as yet been reported, among others being seven cases by Dr. Joseph Price, six of which were successful; adding these seven cases to the table, gives a total of forty-four cases in this supplementary report. It will be noted that in five of the nine fatal cases the anastomoses were made for malignant disease.

TABLE OF RECENT CASES OF INTESTINAL ANASTOMOSES IN WHICH THE "MURPHY BUTTON" HAS BEEN USED.

CHOLECYSTODUODENOSTOMIES FOR CHOLELITHIASIS.

No.	Date.	Publication.	Operator.	Diagnosis.	Operation.	Method.	RESULT.		Cause of Death.	Remarks.
							R.	D.		
1	April 17, 1894.	Buf. Med. & Surg. Journ., July, 1894. Not publ'd.	Mynter.	Cholelithiasis. Enlarged G. B.	Cholecystduodenostomy.	Murphy-button.	S-S	I	.	Rapid recovery. Button passed 22d day. 126 gall-stones.
2	March, 1894.		Bradley.	Obstruction common duct.	Cholecystduodenostomy.	Murphy-button.	"	I	Exhaustion 7th day.	Post-mortem. Profuse hemorrhage from liver, where it had been torn during operation in freeing adhesions. Approximation perfect. Time for operation 40 minutes. Button passed 40 days after operation. Excellent recovery.
3	May, 1894.	"	"	Cholelithiasis. Dilation of G. B.	Cholecystduodenostomy.	Murphy-button.	"	I	.	150 calculi. Button passed 40 days after operation.
4	Oct. 16, 1893	"	Ferguson.	Gall-stones.	Cholecystduodenostomy.	Murphy-button.	"	I	.	
5	Feb. 22, 1894.	"	"	"	Cholecystduodenostomy.	Murphy-button.	"	I	.	"
6	March 23, 1894.	"	"	"	Cholecystduodenostomy.	Murphy-button.	"	I	.	"
7	May 16, 1894.	"	Parahill.	"	Cholecystduodenostomy.	Murphy-button.	"	I	.	Button passed 22d day. Convalescence uneventful.
8	July 26, 1894.	"	Burdick.	Cholelithiasis. Obstruction.	Cholecystduodenostomy.	Murphy-button.	"	I	.	Button passed 14th day. Large calculus allowed to remain in choledochus. Time for operation 20 minutes. Difficulty experienced in pressing large calculus from cystic duct back into gall-bladder. 60 calculi removed.
9	Sept., 1894.	"	Murphy.	Cholelithiasis. Obstruction of cysticus.	Cholecystduodenostomy.	Murphy-button.	"	I	.	

CHOLECYSTODUODENOSTOMIES ON MALIGNANT CASES.

1	March, 1894.	Buf. Med. & Surg. Journ., July, 1894. Not publ'd.	Wiggin.	Stenosis of common duct.	Cholecystduodenostomy.	Murphy-button.	S-S	I	Prostration on 4th day.	No peritonitis. Perfect adhesions. Multiple carcinoma of pancreas and liver.
2	Feb. 2, 1894.		King.	Carcinoma of pancreas.	Cholecystduodenostomy.	Murphy-button.	"	I	.	No peritonitis. Cholemic hemorrhage from mucous surfaces of body.

TABLE OF RECENT CASES OF INTESTINAL ANASTOMOSES.—(Continued.)
RESECTION.—END-TO-END APPROXIMATION.

No.	Date.	Publication.	Operator.	Diagnosis.	Operation.	Method.	RESULT.		Cause of Death.	Remarks.
							R.	D.		
15	Aug. 31, 1894.	Not publ'd.	Beck.	Carcinoma of cæcum.	Resection of cæcum.	Murphy-button.	L	I	.	Ends of intestines sutured. Lateral anastomosis with button No. 3.
16	June 4, 1894.	"	Murphy.	Fæcal fistula.	Resection. End-to-end.	Murphy-button.	E-E	I	.	Removed 25 inches of small intestine. Opening made by button in previous operation had dilated from 3½ up to 5 inches.

SIDE-TO-SIDE ANASTOMOSES.

No.	Date.	Publication.	Operator.	Diagnosis.	Operation.	Method.	RESULT.		Cause of Death.	Remarks.
							R.	D.		
1	July 7, 1894.	Not publ'd.	Wiggin.	(?)	Double anastomosis.	Murphy-button.	S-S	I	.	Death 60 h after oper. from obstruction by adhesions of intestine in a sharp angle at seat of oper. producing obstruction. Line of union at both places perfect and barely visible. Pressure atrophy almost complete at seat of adhesion where adherent bowel protected line of union.
2	Aug. 16, 1894.	"	Meyer.	Fæcal fistula.	Ileo-colostomy.	Murphy-button.	"	I	.	Oblong button used in this case, which passed on 10th day without pain or difficulty.

GASTRO-ENTEROSTOMY.

No.	Date.	Publication.	Operator.	Diagnosis.	Operation.	Method.	RESULT.		Cause of Death.	Remarks.
							R.	D.		
1	May 5, 1894.	Med. Week, Paris: No. 38, Vol II. Not publ'd.	Quenu.	Epithelioma of stomach.	Gastro-jejunos-tomy.	Murphy-button.	L	I	.	Time for operation, 1 hour, 55 minutes. Uneventful recovery. Up in 18 days. Great increase in weight.
2	Apr. 19, 1894.	"	Bressler.	Obstruction of pylorus.	Gastro enterostomy.	Murphy-button.	"	I	.	Death 4 weeks later. Exhaustion. Button found at splenic flexure of colon retained by band of adhesion. No obstruction.
3	Aug. 13, 1894.	"	Mayo.	Carcinoma of pylorus.	Gastro-enterostomy.	Murphy-button.	"	I	.	Death 14 days after. Broncho-pneumonia. Autopsy: Perfect union. Button liberated. Opening about twice as large as button.

TABLE OF RECENT CASES OF INTESINAL ANASTOMOSES.—(Continued.)
 RESECTION.—END-TO-END APPROXIMATION.

No.	Date.	Publication.	Operator.	Diagnosis.	Operation.	Method.	Position of Button.	Result.	Cause of Death.	Remarks.
								R.	D.	
1	June 13, 1894.	Not publ'd.	Limonex.	Strangulated hernia.	Resec. End-to-end anastomosis.	Murphy-button.	E-E	I	.	Button passed 18th day.
2	June 21, 1894.	"	Cochems.	Strangulated hernia.	Resec. End-to-end anastomosis.	Murphy-button.	"	I	.	Resection of 26 inches, button passed 180 hours after operation.
3	June 15, 1894.	"	McCallum.	Strangulation of ileum.	Resec. End-to-end anastomosis.	Murphy-button.	"	I	.	12 inches of ileum resected.
4	April 2, 1894.	"	Newton.	Neoplasm of mesentery.	Resec. End-to-end anastomosis.	Murphy-button.	"	I	.	Buttons passed 14th day. (Small child.)
5	April 7, 1894.	N. Y. Med. Journ., Sep., 1894.	Dennis.	Strangulated hernia.	Resection of ileum.	Murphy-button.	"	I	.	Button passed 22 days after operation. Wound suppurated. Faecal fistula which closed on 27th day.
6	May 12, 1894.	Not publ'd.	Meyer.	Intussusception.	Resection of ileum.	Murphy-button.	"	I	.	Button passed 11 days after operation. Perfect recovery.
7	June 16, 1894.	"	"	In. obstruction. Intussusception.	Resection of ascending colon 12 inches.	Murphy-button.	"	I	.	Button passed 11 days after operation. Discharged July 24, 1894. Died of marasmus, August 14, 1894.
8	June 18, 1894.	N. Y. M. J., Sep., 1894.	Lilienthal.	Carcinoma transverse colon.	Resec. transverse colon 6 inches.	Murphy-button.	"	I	.	1 3/4 inches (in diameter) button used. Passed 18th day without pain.
9	Nov. 11, 1893.	(?)	Ricketts.	Carcinoma of ileum obstruction.	Resection. End-to-end.	Murphy-button.	"	I	Shock. 10 hours.	Time for operation 10 minutes.
10	May 11, 1894.	Mather's Med. Quart., July, 1894.	Outer-bridge.	Carcinoma transverse colon.	Resection. End-to-end.	Murphy-button.	"	I	.	Time for operation, 1 hour, 45 minutes. Several inches of transverse colon resected.
11	June 13, 1894.	Not publ'd.	Meyer.	Carcinoma of rectum.	Resection of rectum 8 inches. Kraske Rehn.	Murphy-button.	"	I	.	Death July 22d. Gangrene of lower end of sigmoid with faecal fistula above line of union, due to tension of meso-sigmoid. Button accomplished purpose admirably. Voided on 11th day.
12	June 7, 1894.	"	Cobb.	Syphilitic stricture.	Anastomosis around stricture.	Murphy-button.	"	I	.	Died 14 days after. Pneumonia. Anastomosis perfect.
13	Feb. 27, 1894.	"	Ferguson.	Cancer of caecum.	Excirpation of caecum 14 inches.	Murphy-button.	E-S	I	.	Patient died 4 weeks later of diarrhoea. Autopsy: Perfect approximation. Opening large as button. Diphtheritic colitis.
14	June 17, 1894.	"	Davis.	Penetrat. wound of abdomen. Lac. of bowel.	Resection. End-to-end.	Murphy-button.	E-E	.	Shock. 3 hours.	Never rallied from shock of injury.

TABLE OF RECENT CASES OF INTESTINAL ANASTOMOSES.—(Concluded.)
GASTRO-ENTEROSTOMY.

No.	Date.	Publication.	Operator.	Diagnosis.	Operation.	Method.	Result.		Cause of Death.	Remarks.
							Post- Op.	R. D.		
4	Aug. 6, 1894.	Not publ'd.	Meyer.	Malignant stric- ture of pylorus.	Gastro-enterosto- my.	Murphy- button.	L	I	. . . . .	Rapid recovery. Discharged August 25, 1894.
5	Aug. 23, 1894.	"	"	Carcinoma of py- lorus.	Gastro-enterosto- my.	Murphy- button.	"	I	. . . . .	Patient still in hospital doing well (September 6, 1894).
6	Apr. 20, 1894.	Buf. Med. & Surg. Journ., July, 1894.	Mynter.	Carcinoma of py- lorus.	Gastro-enterosto- my.	Murphy- button.	"	I	. . . . .	Vomiting ceased. Patient left hospital in three weeks.
7	May, 1894.	Buf. Med. & Surg. Journ., July, 1894.	"	Carcinoma of py- lorus.	Gastro-enterosto- my.	Murphy- button.	"	I	Exhaustion 12 hours.	. . . . .
8	1894.	Buf. Med. & Surg. Journ., July, 1894.	"	Carcinoma of py- lorus.	Gastro-enterosto- my.	Murphy- button.	"	I	. . . . .	Smallest size button used which could not possibly grasp tissue and was never intended for that purpose. The wall of stomach slipped out of its em- brace and allowed contents to escape. A running suture is not necessary, if proper size button is used. Large carcinoma of stomach.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 24, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

PROLAPSE OF THE RECTUM.

DR. F. KAMMERER presented a young man who for a year had had prolapse of the rectum to the extent of about two inches and a half. The parts could be very readily replaced, as the sphincter was greatly dilated, admitting the introduction of four fingers into the rectum. About five weeks previously Dr. Kammerer performed Robert's modification of Dieffenbach's operation, consisting in excision of a triangular piece of the posterior rectal wall, including the external sphincter.

In this case the triangle was about three inches long, with a base at the external sphincter of about an inch and a half. Union took place by first intention and the result had been perfect. In three cases operated upon according to this method Dr. Kammerer had introduced a strip of iodoform gauze below the tip of the coccyx at the upper angle of the wound to prevent retention at this point where it was difficult to sew together the soft parts, so that no wound or cavity should remain.

Last year he had shown to the Society a woman upon whom he had operated by this method for prolapsus of the rectum to the extent of four inches, dilatation of the anus admitting the introduction of the entire hand into the rectum, and also for complete prolapse of the uterus. In that case he excised about four inches of the rectum, performed ventral fixation on the prolapsed uterus, and a plastic operation on the vagina, and had thus effected a complete cure. He had examined the patient a week ago and found that there was not the slightest indication of a recurrence of the rectal prolapse. The uterus was also in excellent position. The woman had been employed as a cook, standing on her feet all day during the summer.

SYPHILIS CUTANEA VEGETANS, OR FRAMBOESIA.

DR. A. J. MCCOSH presented an unmarried girl, about twenty years of age, who denies having had any venereal sore, falling out of hair, eruption, or headaches, yet who has a strawberry-like growth at the end of the nose which has, no doubt, a syphilitic basis. She had a sore on the roof of the mouth two years and a half ago, for which she was given iodides for three months when the ulcer healed. Two years ago she had a sore throat which was cured in one month. One year ago she had a bad rhinitis. Nine months ago a pimple appeared just below the nasal septum, when she entered a hospital for treatment and remained for five months, and was given iodides, but without improvement. Six months ago the sore had spread into the septum. At present there is a papillomatous excrescence on the tip of the nose which looks much like a very large raspberry. The base of such a growth is usually a syphilitic lesion, but the papillomatous excrescence does not probably differ from other warty growths. As a rule, such growths do not disappear under syphilitic treatment without the employment of the sharp spoon or cautery. They have been much discussed during the past twenty-five years, but the general opinion of dermatologists and syphilographers at present seems to be that they have a syphilitic base while the excrescence is sometimes a pure syphilide and sometimes a papilloma.

Dr. McCosh, in replying to a question, said he did not doubt but what ichthyol and almost every other form of local application had been applied, as she had been under continuous treatment for the past nine months for the lesion of the nose. During the greater part of this time iodides had been administered. During the past four weeks no antisyphilitic medicine had been given, and in the month this large framboesia had grown out from an unhealthy ulcerating surface, the appearance of which was not typical, either of syphilis or lupus. Microscopic examinations of the growth revealed simple inflammatory tissue, and no tubercle bacilli.

PARAPLEGIA FROM SPINAL FRACTURE; COMPRESSION OF CORD; EARLY LAMINECTOMY; CURE.

DR. R. H. M. DAWBARN presented a young woman who, a year ago, had fallen four stories and landed in the cellar on a coal-heap. She was taken to a hospital with a broken back and complete motor paraplegia, and almost complete sensory paralysis from the seat of the

injury down. Dr. Dawbarn operated upon her, performing laminectomy about two hours and a half after the injury. A long incision was made, extending above and below the eleventh and twelfth dorsal vertebræ, which were found fractured and distinctly depressed. Besides being crushed in several places, there were two points projecting from these two vertebræ into the dura and apparently on into the cord. The arches were removed with the rongeur forceps, the dura was slit about four inches. At once there escaped a quantity, perhaps two ounces, of cerebro-spinal fluid. Blood clots were turned out, and the cord was found distinctly indented, but not apparently actually lacerated. It was certainly not severed, nor was there any considerable loss of its substance. On running a probe down along beneath the cord, it met with resistance opposite the twelfth vertebra, due to the projection of a sharp spicula of bone, like the end of a lead-pencil, compressing and apparently sticking into the anterior surface of the cord. It was with great difficulty reached and removed, by gnawing away with the rongeur forceps the arch, nearly to the body of the bone, on one side. Almost immediately upon removal of the sharp fragment mentioned, the whole wound filled with blood. Doubtless the fracture had torn across the *venæ basis vertebræ* at that point; and detaching the fragment of the broken body gave exit to blood from this source. The hæmorrhage was controlled by two long strips of iodoform gauze inserted under (in front of) the cord, and half-way encircling it. The dura was then sutured with running catgut, the wound was closed, save for the gauze drains mentioned, and a splint of plaster of Paris was applied from the armpit to below the hips. The operation lasted about an hour and a half. The patient did perfectly well; the gauze was removed between the second and third days, a trap-door being cut into the splint for that purpose. There was no pus. The urine had to be drawn for about a month after the operation, and there was no control over the rectum during that length of time. Strychnine, massage, and Faradic electricity have been regularly used. Within the last two months the patient has resumed her work as house-maid and cook. The right leg is a little weaker than the left, though not much. It does not affect the gait. She has had no pain or aching in the back, but there has been a little pain in the right leg, and as it has been rather increasing of late, sensibility has not as yet been quite fully regained in that limb.

The good result in this case was attributed by the reporter to the immediate operation. If it had been postponed a week or longer, the result would have been much less favorable.

DR. JOHN A. WYETH remarked that from personal experience he was of the opinion that where there was loss of cord substance restoration of function was not possible. Since there had been almost complete restoration of function in Dr. Dawbarn's case, he would infer that the cord had not been actually lacerated but compressed.

With regard to the development of pain in this case, he thought it probably was the forerunner of restoration of function in the part of the cord which had been severely compressed. He had noticed that fact in a case of nerve suture and in one of cord injury.

Dr. Wyeth thought no case had been presented to the Society which encouraged us more than this one to operate early for relief from injury to the vertebral column with partial or complete paraplegia. He had expressed the opinion before, but did not know whether it was that of the Society, that in all cases of injury to the spinal column with resulting paralytic symptoms, one should operate early if he meant to operate at all. He wished to emphasize that view on this occasion. If it was intended to condemn the patient to pursue a course of inaction, then never operate. Of the cases which he had operated upon, in five the operation was late, and in only one of these were results obtained which gave any encouragement. In that one there was considerable improvement, but it was evidently due to removal of compression of the cord. An immediate operation offered a much better chance of recovery, for where compression from hæmorrhage or depressed bone was allowed to remain weeks or months the resulting damage was likely to prove permanent.

DR. DAWBARN agreed with Dr. Wyeth, and could relate one case of his own already published,—a young man who fell from a height and broke his back,—in which a late operation had proved of decided benefit, although he would not think of tolerating delay again if he could prevent it. In that instance the paraplegia was six months old when first he saw the patient. He waited two months more until the neurologists admitted that electricity could be of no further value. He had used under their advice as high as 100 cells, using two chloride of silver batteries, and nevertheless with steadily decreasing contractile power in the muscles, and with reaction of degeneration present. He would now about as soon consent to wait and use electricity in a case of hemiplegia resulting from depressed fracture of the skull.

In the case in question he had finally cut down and found fracture of the arches of the last dorsal and first lumbar vertebræ and

diminution in the size of the underlying cord, which somewhat resembled cicatricial tissue. Before the operation the patient had had absolutely no control over the bladder and rectum; the lower extremities were distinctly cold to the touch; they did not sweat at all, and the toe-nails had not grown for months. The patient had suffered a great deal from pain about the region of the depressed bone, but not in the paralyzed limbs, and there were several large bed-sores over the sacrum and buttocks which could not be controlled. Within a few days after the operation the limbs became warm; had since developed to normal size; sweating was resumed, and the toe-nails grew very rapidly; the bed-sores improved and finally healed. Gradually control had been regained over the bladder and bowel, although the catheter had yet to be inserted sometimes,—six years after the operation. The patient had regained entire control over the sartorii muscles, but only a little over the others. Some months after the operation there began to be vigorous penile erections, for hours at a time, unaccompanied by the least sensation in that organ; and the patient regarded this as a hopeful sign of returning function; but subsequently this phenomenon quite disappeared. He had resumed his work as inspector of contracts, being driven about in a wagon. Had the operation not been performed, he doubtless would have died.

In other words, without an operation in such cases with failing powers there is no hope; with an operation there is some little hope, even though it be not performed until late.

DR. ABBE thought that in most old cases there was very little hope, although there was unquestionably reason for some when there had been no destruction of the cord. But as Thorburn had shown from his extended experience with fractures of the spine and paraplegia, there was almost always pulpification of the cord. When operated upon late the cord was usually found atrophied, and looked like a thin filament at the seat of the injury. Undoubtedly, then, the cord was pulpified in the great majority of cases of injury with immediate paraplegia. In Dr. Dawbarn's case the operation had been followed by excellent results, which would indicate relief of simple compression without pulpification of the cord. But it was not likely that in a hundred cases of paraplegia from fracture one would find in operating more than one in which there was compression alone, and no pulpification.

DR. GERSTER wished to say that while in the overwhelming majority of cases of fracture of the spine there might be pulpification

of the cord, as stated by Dr. Abbe, yet he believed that many surgeons had met with cases in which even extensive fracture had left the cord without serious lasting injury. He recalled the case of a boy whom he showed to the Society seven or eight years ago, and who had broken his neck on taking a "header" from a pile into the water at low tide, forgetting that the water was not as deep as it had been when he had done the same thing at high tide. He was perfectly unconscious when he came to the surface, the head wobbled on the neck, but his companions managed to get him home. When Dr. Gerster saw him there was absolute paralysis of both lower and upper extremities, and of the bladder and rectum. The fracture was at the fifth cervical vertebra. The respiration was also interfered with, and for this reason, if for no other, an operation was impossible under anæsthesia. He therefore simply applied extension. The boy fully recovered, with the exception of a moderate amount of paralysis of the ulnar nerve on one side and a slight ataxic gait on the same side. He had married recently. The inference was to be drawn that the paraplegia was not due to direct severance of the cord, but to pressure probably from a blood-clot. A limited cord lesion might have caused the permanent slight paralysis in the arm and leg.

DR. GERSTER fully shared the opinion of Dr. Wyeth and Dr. Dawbarn that it was proper to operate at once in spinal injuries. The possibility could not be denied, however, that Dr. Dawbarn's case might have recovered without an operation.

DR. WILLY MEYER, having understood Dr. Dawbarn to say that with an operation there was some hope, and without an operation there was no hope at all in old cases of spinal injury, again referred to the case of a young man which he had reported on a former occasion. The patient had fallen from a height and broken the first and second lumbar vertebræ. Total paraplegia had at once been present. For eight months he had been slowly improving, at last moving about on crutches. But being young he wished for a more perfect cure, and came to the city, where he was seen by Dr. Meyer. Nothing could be done except to perform an operation, which he did two years ago. Great care was taken not to injure the cord by the rongeur forceps or other instruments. The dura was incised, but no pulpification or special injury of the cord was found; only some injection. The dura was closed by catgut sutures. The wound healed kindly. There was no rise of temperature, yet the day following the operation there was again entire paralysis of the lower extremities. As this did not

improve he subsequently cut down upon the cord again, and found a sort of syringomyelia, the cord containing multiple small cysts. The patient did not improve, and died about a year and a half after the first operation. Dr. Meyer said he was sure the operation had done harm. Therefore he felt that in old cases in which there had been some improvement we should be very careful about operating. No doubt the early operation in Dr. Dawbarn's case had saved the patient from paraplegia, if not from death.

DR. ABBE added that it seemed to him that what Dr. Gerster has said was very true; that it had not been proved that these cases might not have recovered without an operation. The paralysis is not always due to crushing of the cord, but may be due in part to hæmorrhage, and this may be between the dura and vertebræ, between the dura and cord or into the parenchyma. In either event the recovery may be slow. Unless there was evidence in Dr. Dawbarn's case of sufficient pressure on the cord to have ultimately destroyed its structure, it is extremely probable the patient would have recovered without an operation. It seemed to him that while it was a good case, compared with others of injury to the spine, yet he did not indorse an operation in every instance. He thought the risk of spinal operations to be great enough to make it a serious consideration. One might lose more patients in a hundred from interference than he would save from paralysis not due to destruction of the cord. He would not, therefore, enter upon an operative procedure with much hope in the vast majority of these cases. It must prove exceptional, indeed, to find trouble which the surgeon can relieve.

DR. WYETH inquired of Dr. Abbe what he considered the great danger of the operation, and what is the death-rate.

DR. ABBE replied that he did not know that the statistics had been collated. Personally he had operated upon ten spinal cases and had lost one. Add to the existing shock that of an early operation, with the further risk of considerable hæmorrhage, there results a pretty severe procedure to offer a patient, with the chance of finding a pulpified cord.

DR. WYETH rejoined, saying that regarding the mortality rate, take the president's ten cases, Dr. Dawbarn's two, and his own eight, and there results a total of twenty with only one death. It is best to draw conclusions from personal experience, as one can then judge better of the conditions of the operation than when general statistics are quoted. He did not think the danger of the operation to be very

great, or that it should be considered very seriously in view of the disastrous results, the absolute helplessness which often attend non-interference. Hæmorrhage is easily controlled. He felt strongly that early operation is for the best good of this class of patients.

SARCOMA OF PERONEAL NERVE; EXCISION AND SUTURE OF NERVE.

DR. A. G. GERSTER presented a man, fifty years of age, who, after a history of three years of pain in the right thigh and leg, with the gradual development of a small tumor in the popliteal space, had come under his care in September, 1894. When admitted there was marked tenderness over the right peroneal nerve. A tumor about the size of an English walnut could be felt in the popliteal space. It was freely movable from side to side, and was extremely tender on pressure, the pain radiating downward into the foot. The movements of the knee were not impeded. The peroneal muscles were atrophied and presented partial reaction of degeneration to electrical stimulation. The loss of motor power in the affected group of muscles was relatively very slight compared with the changes in nutrition which had already developed. Sensation for temperature and tactile impressions was decreased to a very slight degree only. Pain sense was, if anything, slightly increased.

When the tumor was exposed by incision, October 6, it was found to involve the peroneal nerve about three inches below the bifurcation.

The fibres of the nerve passed directly through the tumor, forming a part of it. The nerve was stretched both from above and below, the tumor was then removed together with one-fourth inch of the nerve on either end. The knee was then flexed, the divided ends of the nerve united with silk sutures. The wound was united by catgut sutures and usual dry dressing applied, the knee being put up in flexed position.

With the exception of the development of an acute cystitis from careless catheterization by a nurse, the patient made an uneventful recovery so far as the healing of wound was concerned, which was dressed for the first time two weeks after operation.

At the time of presenting the patient there had yet occurred no restoration of nerve function to the sutured nerve.

There was no response to faradic current, direct or indirect, in

tibialis anticus, extensor proprius muscles, extensor longus digitorum, or the three peronei.

No reaction of nerve to galvanic current. In the muscles there was the reaction of degeneration.

Sensation: Thermoanæsthesia on outer side of right leg, also hypæsthesia and hypalgesia.

DR. ABBE said that about six years ago he resected the musculo-spiral nerve for removal of a neuroma, stretching both ends of the nerve and uniting them by buried suture. Primary union followed. He had heard from the patient a year ago, and learned that she could use the arm for ironing and doing general work, but had not regained entire use of it. The tumor was a fibroma and there had been no relapse.

DR. C. K. BRIDGON once resected the musculo-spiral nerve for round-cell sarcoma; within six months a fungous growth recurred as large as a placenta, whereupon he amputated at the shoulder; subsequently he had to remove the scapula and the outer end of the clavicle. Then the disease appeared in the intercostal nerves.

DR. WYETH remarked that he and Dr. Gerster had had a similar experience in which the malignant disease continued to travel up the nerve.

INTRADURAL RESECTION OF THE ROOTS OF THE BRACHIAL PLEXUS.

DR. ABBE presented a man, aged forty years, who since childhood had had a partial spastic paralysis of his right arm and leg,—not enough to prevent locomotion, but causing inversion and dragging of the foot.

Incessant athetoid motion of the upper limb with pain in the forearm led Dr. Charles Phelps to amputate the right forearm several years since.

The pain and athetoid spasm continued in the remaining portion, and Dr. Weir amputated at the shoulder-joint five years ago, hoping to relieve him.

Pain recurred, and three years since Dr. Abbe resected the bulbous nerves of the axillary plexus.

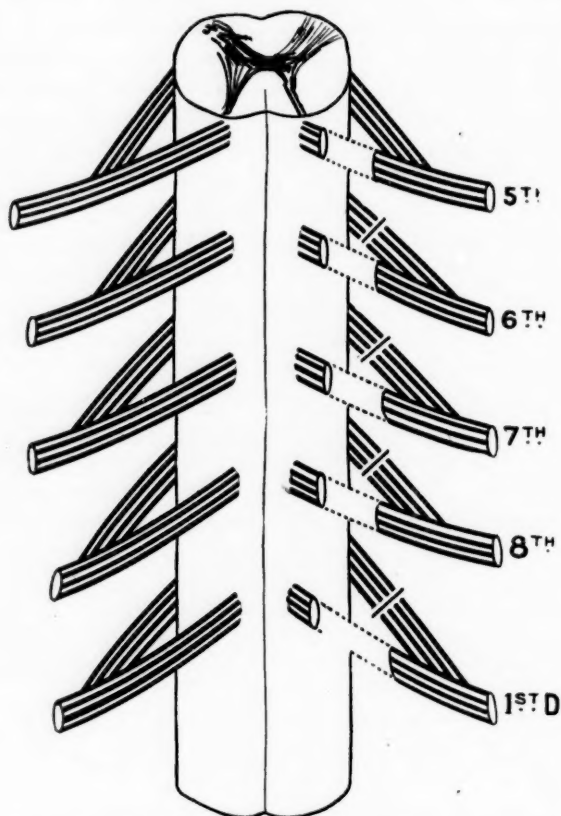
Again the athetoid spasm and pain of the shoulder recurred and caused the scapula and clavicle to be raised high up towards the neck.

Dr. Graeme Hammond exhausted the resources of medicine, electricity, and local applications for a year or more, and finally

referred him to the reporter for stretching the brachial plexus in the neck.

DR. ABBE advised intradural section of the roots and operated June 4, 1894.

He exposed the cord from the fifth cervical to the first dorsal



Intradural resection, posterior roots of brachial plexus, with section of the anterior roots.

arch, inclusive, by a method which he had used in two former cases. (*New York Medical Journal*, February, 1889; *Medical Record*, July 26, 1890.)

A full-length incision in the dura was made. As usual, about three ounces of cerebro-spinal fluid escaped, after which he picked up the posterior roots with a strabismus-hook and excised a quarter inch

of the fifth, sixth, seventh, eighth cervical, and first dorsal, as shown in the diagram.

The cord was then drawn gently aside and the anterior roots cut through, excepting the fifth, about which he was in doubt whether the fourth were not with it at this point of the wound, and he hesitated to divide this, owing to its phrenic supply.

The resection of the posterior roots (generally regarded as the sensory conductors) of the entire right brachial plexus was thus accomplished with exactness.

The anterior roots which were deemed responsible for the athetoid spasms were divided, except probably the fifth.

The dura was sutured with fine catgut continuously; the ligamentum nuchæ and muscles united by buried catgut stitches and the superficial fascia and skin independently.

Primary union occurred.

The pain abated very much, and the spasm almost entirely, after operation.

Of the two other cases in which he had performed a similar operation, in one six years ago, in the other five years ago, in both there had been very great, but not complete, relief from pain up to the present time. In the first the pain had started as a peripheral neuritis, the arm had been amputated for its relief before Dr. Abbe saw the patient, but the pain ascended and demanded the further operation.

DR. McCOSH said that he had recently cut two posterior dorsal roots, yet absolutely no anæsthesia followed, a fact due to the free anastomosis of the peripheral branches of the dorsal nerves. Sherrington has recently shown how these branches overlap one another, so that, in order to destroy sensation in a portion of the skin of the back, it is necessary to divide at least three and perhaps more of the posterior dorsal roots.

TECHNIQUE OF RECTAL RESECTIONS.

DR. F. W. KAMMERER read a paper entitled, "Some Points in the Technique of Rectal Resections." (See p. 1.)

DR. McCOSH considered the point made in the paper with regard to care that the blood-supply of the rectum should not be cut off to be a very important one. A patient of his died recently on this account. Six or seven inches of the end of the gut became gangrenous and led to fatal sepsis. He was also in accord with Dr. Kam-

merer with regard to the propriety of performing colotomy where the case is one for resection. Where the lower part of the rectum is also to be taken away he hardly thought colotomy necessary.

As to the results in cancer, in a patient whose rectum he excised for cancer three years ago last July, removing ten or eleven inches of the gut, there has been no recurrence. In that case the operation was performed at two sittings. At the first operation the diseased portion was removed, and the proximal end of the gut was pulled down to the lower end, which consisted of the anal portion of the rectum, but the two were not sewed together until ten days later. When the second operation was done the patient had perfect control of the bowels, except when she has diarrhoea, and then there is some leakage.

DR. BRIDDON remarked that he had had very considerable experience with high resection of the rectum, and that in some of his cases a large portion of the sacrum and coccyx had been removed. His memories of these operations were certainly not pleasant. Where one goes above the third sacral foramina there is apt to be trouble from paralysis of the parts supplied by the nerve that issues from the same. Although some writers are inclined to disregard that, he thought the consequences to be sometimes very serious. The method of high resection described by Dr. Kammerer certainly has great advantages. Its only disadvantage is the high resection of the sacrum. By snipping the peritoneum and the fascia, where it is reflected from the rectum on either side, the gut can be pulled down, and by avoiding injury to the vessels behind the blood-supply will not be cut off, and this can be done after removal of the coccyx and tip of sacrum.

In cases of cancer with involvement of the retro-rectal glands, Dr. Briddon would make permanent colotomy, amputate the diseased rectum, and make no attempt to restore the continuity of the canal.

He found it almost incomprehensible how faeces could pass by the spur of an inch to an inch and a half formed in inguinal colotomy, but they usually did and gave trouble, but, fortunately, the patient could be assured that it would be likely to cease within a few weeks. He had found in the ordinary temporary institution of faecal outlet, such, for instance, as that described by Cripps, in which a longitudinal section of the gut is made that as much excrement passes through the rectum as through the artificial outlet. He had now a case in the hospital in which that condition exists.

DR. WILLY MEYER thought that one of the most important questions in connection with this operation was, how best to pull down the lower end of the sigmoid flexure; for every one who had done the operation must, in this or the other case, have had some difficulty in that direction. In a few cases he had been under the impression that the difficulty was in a short meso-sigmoid. While in two cases he had cut as Dr. Kammerer recommended, but only about two to three inches upward and parallel to the gut, there was still difficulty in drawing down the gut.

Regarding inguinal colotomy in resections for neoplasms, this is not necessary where we have control over the gut before the operation,—viz., in ulcerating, not obstructing neoplasms. Yet if the rule were established that an artificial anus should first be formed in every case it would be a safe-guard especially as far as primary union of the sutured gut is concerned. About three years ago he presented to the surgical section of the Academy of Medicine a patient from whom he had removed the neoplasm without colotomy, having for about ten days given careful attention to emptying the bowel and getting it in condition to permit of primary union, which was afterwards secured. But he thought it a perfectly wise rule to make an artificial anus.

He had done osteoplastic resection of the sacrum three times, and had been struck by the ease of access to the deep parts. It seemed to him to be only fair that the operation should be called Rehn's modification of Kraske's operation, and not Rydygier's, as Rehn was first to describe it at the German Surgical Congress in 1891.

DR. DAWBARN quite agreed with Dr. Kammerer with regard to the propriety of inguinal colotomy as a preliminary step in all cases of excision of rectal cancer, inasmuch as the mortality from inguinal colotomy is now rather less than 5 per cent., and since most of the fatal cases of resection of the rectum are due to infection.

For the control of hæmorrhage in this operation, upon women, he suggested a method which he had found to work very satisfactorily. It consisted in thoroughly cleansing the vagina, and then in passing the largest size of pedicle silk, by means of a large, curved Peaslee needle (the patient being in Trendelenburg's posture, or else the knee-chest position), through the vagina at the highest point in Douglas's pouch, and so out through the skin at the back, by the side of the upper part of the sacrum. Then thread the needle again with the other end of the ligature, reintroduce it into the vagina, and so out

at the other side of the sacrum; and thus tie off, or rather temporarily constrict, the rectum and its surrounding blood-supply at the level of the highest point in the vagina. Then go ahead with the Kraske operation. It was wonderful how perfect was the control of bleeding in that case. Of course, this suggestion only applies to operations quite near the anus. The ligature was slackened slowly, at length, and spurting points were ligated.

Of course, this would not be a wise procedure if there should be gut in Douglas's sac; but he first introduced his fore-fingers simultaneously into the rectum and vagina, and thus was enabled, by feeling Douglas's pouch, positively to exclude that condition. Besides, Trendelenburg's or the knee-chest posture makes the absence of gut from the *cul-de-sac* almost certain.

DR. KAMMERER explained that his paper referred only to resections of the rectum, not to amputation. Yet he thought that in some amputations previous colotomy offered great advantages.

As to Dr. Briddon's remark that after incising the peritoneum the bowel can be pulled down without loosening it from the anterior sacrum. This has not been his experience. It is in combining these two procedures that we are enabled to draw down the bowel. Incision of the peritoneum alone does not loosen it all around. It is necessary to separate the tissues binding the gut to the sacrum.

In the operation of a temporary inguinal colotomy he thought that only a longitudinal incision should be made, never a transverse. In making the transverse incision he would always cut through the entire bowel from the mesentery, and if the loop is brought well out the entrance of feces into the lower end can be prevented, although it is sometimes a very difficult thing to do permanently.

He did not quite agree with Dr. Briddon in his criticism upon the Kraske operation or its modifications. He had done it quite a number of times, and had seen no paralysis following. He had never noticed any symptoms after dividing below the third sacral foramen, neither in these cases, nor in those operated upon according to Rydygier. In the latter instance the nerves are divided on one side of the sacrum only.

Nor did he agree with Dr. Meyer, that cases of carcinoma do not call for a temporary artificial anus when the lumen of the gut is not entirely obstructed. These cases pick up wonderfully in a few weeks after establishing an artificial anus and diverting the feces away from the ulcerated surface. They are thus put in much better condition for the major operation.

Dr. Kammerer referred again to the liability of a fistula forming at the posterior margin of the sutured bowel where colotomy had not preceded resection, and to the difficulty of closing the same. He did not look with much favor upon the method of controlling hæmorrhage, suggested by Dr. Dawbarn, although he has had no personal experience.

LARYNGECTOMY FOR CARCINOMA OF THE THYROID CARTILAGE.

DR. C. K. BRIDDON presented a specimen with the following history: A man, forty-eight years old, was admitted to his service in the Presbyterian Hospital on June 7, 1894.

No evidences of either tuberculosis or of syphilis in his previous history. His trouble dated back five months when he began to cough; shortly hoarseness came on. These both increased gradually and constantly. Then his throat became swollen and tender. Pain came on, radiating upward from his throat to his head, especially on the right side. About six weeks before admission he began to have slight difficulty in breathing and swallowing became painful. Since then all his symptoms have continued and cachexia has developed. When admitted there was in the region of the larynx and apparently intimately connected with it an irregular tumor, hard to the touch, seeming to present, however, softer spots within it. It was tender. The mass was situated on the right side and followed the movements of deglutition. An aspirating needle introduced into the tumor failed to bring anything but blood.

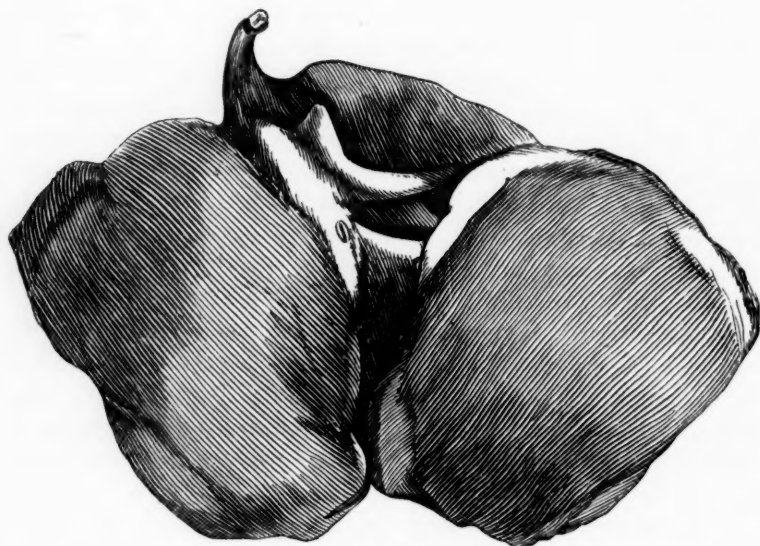
On laryngoscopic examination the mirror reveals a red shiny mass on the right side, its surface ulcerated, the mass hiding from view almost completely the right vocal chord, and narrowing the aperture to a very small chink. A diagnosis of malignant growth of the larynx was made.

Operation for removal of the larynx was done June 20. Position dorsal; the patient's head and shoulders slightly elevated, the neck also raised somewhat, and made more prominent by a small sand-bag under it. Incisions: first a transverse one just below the hyoid bone, the cut extending down to the thyro-hyoid membrane, dividing transversely the overlying subhyoid muscles; a second incision, one inch below the inferior border of the cricoid cartilage, transversely from one sterno-mastoid muscle to the other, the mid points of these two incisions connected by a vertical one extending down

to the thyroid and cricoid cartilage and to the trachea. The flaps made by these incisions being dissected up and reflected the isthmus of the thyroid gland was divided between the catgut ligatures.

The tumor itself was seen to be in the shape of a flattened sphere about three inches in its vertical diameter and two in its transverse. It occupied the whole of the right side of the thyroid cartilage. So thoroughly has the mass invaded the cartilaginous structure at this point that the resemblance to the normal parts could be made out.

Dissection was done on both sides successively. On the right,



Represents a section of tumor, and R-thyroid, disclosing interior of larynx.

however, the presence of the mass prevented the dissection from being carried so close to the cartilage of that side. When the tracheal end of the tumor had been sufficiently freed from surrounding structures, hæmostasis being satisfactory, the anterior half of the trachea was divided; silk loops being passed in on either side through the tracheal wall for its support the section of the tube was completed; as soon as this was done a tracheal canula was inserted, securing accurate closure of the lumen. The two silk loops introduced on either side through the tracheal wall were fastened to the small tongue on the canula serving to steady the apparatus and prevent its slipping

from the air-tube. Through this the anæsthetization was continued, no blood finding its way into the respiratory tract.

The dissecting up of the lower part of the mass—namely, the cricoid and inferior portion of the thyroid—from the œsophageal wall posteriorly was then carried on, the constrictor muscles of the pharynx being severed, the main thyroid vessels were not molested. The posterior part of the larynx was then dissected away from the mucous membrane of the pharynx, which was cut away at the level of the aryteno-epiglottic fold.

Hæmostasis being complete, the canula was removed from the trachea and the circumference of the respiratory tube was stitched, its anterior half to the lower edge of the lowest transverse incision, its posterior half to the upper edge of the same. The same method of suture was adopted above to the pharyngeal opening. A small drain of iodoform gauze was then introduced under the lateral flaps at their upper part running down to their point of junction with the trachea. The edges of the vertical incision being sutured the operation was complete, and a protective dressing was applied to the wound above the tracheal opening.

The patient rallied fairly well from the operation. A sponge wrung out in hot water was applied over the tracheal opening, the patient drawing the heated and moistened air through its meshes, the sponge being renewed every few minutes. He was fed entirely by rectum, it being deemed inadvisable to insert a stomach tube into the œsophagus on account of the danger of bursting out the sutures in the very thin mucous membrane of the anterior wall of the pharynx. He responded fairly well to his stimulation and to his rectal nourishment for two days. On the third day, however, his condition changed, his pulse and respirations became rapid, and he succumbed to bronchopneumonia on the fourth day. The wound was clean.

Report of Dr. Thacher, Pathologist.—Microscopical examination: Mostly fibrous connective tissues, with some scattered striated muscle. But there are abundant cellular patches, the cells being of medium size, of no characteristic shape, often with two or more nuclei generally in alveoli, with fairly sharp outlines, should probably be classed as a cancer.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, November 14, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

HIP-JOINT AMPUTATION FOR SARCOMA OF FEMUR.

DR. CHARLES K. BRIDGON presented a man, twenty-three years of age, upon whom he had done a hip-joint amputation. This man was admitted to the Presbyterian Hospital, June 11, 1894, on account of a fusiform swelling of the lower half of the thigh, which diagnosed to be a sarcoma of the femur. He was slightly emaciated, but otherwise in fair general condition, without evidences of similar trouble elsewhere in the body. June 18 he was subjected to operation. Hæmorrhage was controlled by Wyeth's pins and stout rubber tubing. A raquette incision on the outer side of the thigh was made.

Skin flaps dissected up and retracted; the structures over the great trochanter were divided down to the bone, the attachments of the psoas and iliacus muscles severed, the capsule of the joint cut circularly near the margin of the acetabulum, and the head of the femur wrenched forcibly from its socket, the ligamentum teres being torn away in so doing. The head of the bone being out of the acetabulum, the various muscular layers were divided circularly, and the amputation completed. After the removal of the extremity the blood-vessels in the flap were secured and ligated, and the tubing and pins removed. Perfect hæmostasis being obtained, a small drain of iodoform gauze was introduced into either end of the wound leading down to the acetabular cavity, the flaps approximated with silkworm-gut sutures, and a snug aseptic dressing applied. An examination of the amputated limb showed the presence of a fusiform sarcoma of the femur, pronounced later by the pathologist to be of the small wound-celled variety, extending below almost to the knee-joint, and above to such

a limit that, had the femur been sawn through in the operation instead of disarticulated at the hip-joint, doubtless many of the sarcoma cells would have been set free in this way in the wound.

So little blood was lost during the operation that the patient suffered scarcely at all from shock. Healing progressed rapidly. From the time of the operation the patient's general condition began to improve, and on August 24 he was discharged, the wound being healed.

EXTRA-UTERINE PREGNANCY; LAPAROTOMY.

DR. CHARLES K. BRIDDON presented two patients upon whom he had made abdominal section for the relief of extra-uterine pregnancy. In the first case, that of H. H., aged twenty-eight years, the history was as follows: Six years before she had borne a child; ten weeks before she began to have remittent pelvic and lumbar pain, which was followed in two days by flowing. Pain and hæmorrhage continued for two weeks, and then the patient passed some material which was called, by the family physician, an abortion at two months. The pain, however, continued; the abdomen increased in size, and there was considerable loss of general health. When admitted her abdomen was large, and there was marked resistance and tenderness, especially over the right side. By vagina a mass could be felt filling up the cul-de-sac of Douglas, the uterus being pushed well forward. It was tense and tender, and apparently contained fluid. On July 11, Dr. Briddon made a median abdominal incision four inches long, which exposed the uterus, large, soft, and adherent to the small intestines. After tearing away the adhesions a large mass was seen behind the uterus extending laterally in both directions. This was opened, and a number of old clots besides fresh blood escaped. The placenta was situated to the right and high up. Rapid separation of placental tissue, and free use of hot water controlled the hæmorrhage, which was very free. The foetus was contained in a cyst on the left side of the pelvis, whilst the unusually-developed placenta was intimately adherent to the viscera on the right side, when an attempt was made to peel this off; the hæmorrhage was of a very serious character; it fairly welled up. The only way to deal with it was to separate the adherent mass as rapidly as possible, inundate with hot water, and trust to the introduction of a voluminous tampon, and this succeeded, though the patient was in a very precarious condition.

The condition of the patient after operation was exceedingly bad, and an intravenous infusion of twenty-four ounces of salt solution with free use of stimulants was required.

The foetus was of about three to four months' development, not macerated. Evidently died just before or during the operation. Recovery was uneventful. Wound healed slowly by granulation, and patient was discharged cured September 11, 1894.

The second patient, M. G., twenty-seven years of age, entered the service of Dr. Briddon in the Presbyterian Hospital, on January 1, 1894, with the following history: She had menstruated normally since the age of sixteen. Three years ago she was married. Since then she has had two children; the first born two years ago, the last one year ago. She nursed the last child, and noticed no flow till seven weeks ago, when she had some bloody discharge. It lasted, however, for only two days, and did not return till two weeks ago. Since then she has had some bleeding on and off. Ever since the return of the flow, seven weeks ago, she has had more or less pain, referred at first to the abdomen generally, later localizing itself in the pelvis. A week ago she passed some shreds of tissue from the vagina, intermingled with clotted blood.

On admission she complained of varying pain in the lower part of the abdomen, especially on the right side, not very severe. Examination by the vagina detected a mass, the size of an orange, behind and a little more to the right of the uterus, somewhat tender. By external palpation of the abdomen, a certain sense of resistance could be felt low down on the right side.

January 3, Dr. Briddon made an incision midway between the umbilicus and pubes, through which a mass was revealed posterior to and somewhat to the right of the uterus; size about that of a small orange. It was fixed by firm adhesions to the uterus, somewhat less so to the small intestines. Adherent to it above also was the appendix. This was ligated and removed. Attention was now turned to the mass itself, which was seen to have its place between the layers of the broad ligament. Its surface was of a dark bluish color, and deeply congested. In separating it from adhering parts a "blood cyst" was opened into. The blood was removed on sponges, and the mass finally freed from its adhesions to surrounding parts, tied off with silk and cut away. The mass thus removed was made up of the right ovary and tube, the broad ligament, "blood cyst," and adhesions. The cyst was seen to contain, in addition to some clotted

blood, a small mass, the size of an English walnut, containing indistinct foetal remains. The left ovary and tube were normal in appearance; they were therefore not disturbed. The bleeding from the torn adhesions was controlled by a strip of iodoform gauze, passed to the bottom of the wound, and left in for drainage. The upper two-thirds of the incision were closed with silkworm-gut sutures, an aseptic dressing applied, and the patient returned to the ward. She made a good recovery. The wound healed rapidly, and on February 10 she left the hospital a well woman.

She now returns in the ninth month of normal pregnancy.

PYONEPHROSIS; NEPHRECTOMY.

DR. BRIDDON presented a woman, fifty-two years of age, in whom removal of the left kidney had been done by him for the relief of abscesses therein. In September, 1892, she had been first seized with severe pain in the left lumbar region, which lasted for two hours, and was followed by fever and sweating. Eight similar attacks have since occurred. During these attacks the urine remains unchanged in character or quantity. During past six months the septic symptoms have been constant, with much deterioration of general health.

On admission the urine contained 15 per cent. of pus, but was otherwise negative. A tumor was also discovered, five inches by three inches, in the left side just below the free margin of the ribs, which was movable and somewhat tender. September 26, she was subjected to operation. Her general condition was so extremely bad that free use of stimulants had to be resorted to. An incision was made six inches along the outer border of the left erector spinæ. The kidney was found very much enlarged, and the connective tissue immediately outside the capsule was traversed everywhere by enlarged tortuous vessels, so that, if an attempt had been made to enucleate within this investment, it is probable that the patient's life would have been compromised by hæmorrhage. To make room, the vertical incision was supplemented by a transverse one, five inches long, commencing midway between the extremities of the first. In separating the adhesions near the hilum a cavity was opened, which contained about eight ounces of thin purulent urine. This was evacuated and the kidney brought into the wound. The pedicle was isolated and transfixed by an aneurism-needle holding strong silk.

The patient's condition was so bad as to preclude any satisfactory examination of the ureter. The wound was partially closed with silkworm-gut sutures, and a tamponnade of iodoform gauze was introduced to the bottom.

About pulseless when removed from the table, a saline infusion was given besides free stimulation. Her condition was precarious until morning, when reaction was fairly established.

Examination of the kidney after removal showed the pelvis and calyces to be much dilated. There were areas of simple inflammation distributed throughout the kidney tissue, with dense infiltration with leucocytes, especially near the mucous membrane of the pelvis; also small foci near the capsule. The tubules in some places were normal and in others obscured by leucocytes. The after-history of the case was uneventful. September 27, she passed thirty-two ounces of urine; October 1, thirty-five ounces; and November 2, sixty-five ounces. Pus has almost disappeared, there only being a trace at the present time.

All ligatures came away by November 2. Wound now is a small, healthy, granulating sinus. General health is very much improved.

EXOPHTHALMIC GOITRE.

DR. BRIDDON presented a boy, seventeen years of age, who was the subject of exophthalmic goitre. He called attention to the prominence of the eyes, and said that over eight weeks ago, when he first saw the patient, the thyroid tumor was much larger than at present. The only treatment used had been iodide of potassium in increasing doses, the amount taken at present being twenty grains three times a day. The effect on the goitre had been marked, but the eyes were as prominent as before.

He inquired whether any of the members had tried the method which some German surgeon had advocated of simple division of the thyroid isthmus. He was unable to understand how it could act, but would be disposed to try it in preference to thyroidectomy. Iodide of potassium had been tried in other cases without avail, and possibly the diminution in the size of the goitre following its use in this case was merely a coincidence.

DR. KAMMERER said he had operated in two cases of exophthalmic goitre some years ago, and they were the only ones which he had lost out of a considerable number of extirpations for cystic, parenchymatous, and malignant tumors of the thyroid. In one of these instances he tied

the four thyroid arteries according to Rydygier. In the other, excision was made of the greater part of both lobes, which were much enlarged. The operation was at first well borne, the patients coming out of the anæsthetic nicely, but the pulse soon began to increase, running up to 220-240 before death. Cyanosis set in, and both patients succumbed to these symptoms about twenty hours after operation. Careful dissection, made after death, failed to reveal any injury whatever to the sympathetic or pneumogastric nerves. The speaker believed, however, that lately some surgeons had little fear of extirpation in these cases, and that even in this city very good results had been thus achieved. But other operators had warned against extirpating these tumors, and had recommended ligation of the arteries instead. Dr. Kammerer's own experience had made him wary about operations for this condition, especially when the tumors were large, as in the two cases mentioned.

In reply to an interrogatory by Dr. Briddon, Dr. Kammerer said the pulse before the operation in his cases had been variable, running as high as 120.

DR. WILLY MEYER remarked that while simple division of the isthmus of the thyroid might have been done, it certainly had not been generally accepted as of any value. According to recent literature it would seem that the correct treatment was partial or total extirpation. Hahn, of Berlin, had found removal of the tumor on one side followed by cessation of the exophthalmus on that side, and a later operation on the other half had been followed by the same result. All the nervous symptoms disappeared. This would seem to confirm the theory that the origin of the disease was local, situated in the goitre itself, and not in the sympathetic nerve. The only correct treatment, therefore, would seem to be extirpation, internal remedies having proved useless.

ILEO-COLOSTOMY FOR FÆCAL FISTULA BY MURPHY'S OBLONG BUTTON.

DR. WILLY MEYER presented a young man of twenty-two years, with the following history: On the 22d of September, 1891, during sleep, part of a falling ceiling struck him on the abdomen. He experienced intense pain and was unable to work next day. Several weeks later a swelling developed which compelled him to give up work. A physician made a small opening into the abdominal swelling and gave exit to a large amount of pus and some fæcal matter.

A faecal fistula was thus formed which afterwards would alternately close and open. For some weeks, prior to Christmas, 1893, he was able to work again, but at this date the faecal fistula reopened, he entered the German Hospital the latter part of May, 1894. At this time nothing was visible but a small sinus which admitted a probe upward and downward, evidently into the peritoneal cavity. An incision was made parallel to Poupart's ligament which was met by a shorter one perpendicular to it on the outer side of the rectus, in order to give access to the neighborhood of the vermiform appendix, as it was thought this organ might be the cause of the trouble. It was found perforated near its base, in the midst of a matted coil of intestine and was removed. Dr. Meyer had been very careful in separating the adhesions, yet on the third day following the operation a larger amount of faeces passed through the wound. This baffled treatment, and it was decided to make a free incision in the median line, search for the loop of intestine which was the origin of the fistula, and make anastomosis between the parts above and below the faecal fistula, which was done August 16. He regretted not having, before opening the abdomen, introduced a probe into the fistula, to be left in place during the operation, since it proved impossible without such a guide to positively locate the affected loop of intestine from within. Lateral anastomosis being made, between the loops of the ileum, which seemed to lead to the fistula and the transverse colon. The longer button of Murphy was employed. Its introduction was as easy as that of the round button; the incision into the gut needed only a trifle longer to strengthen the union, three Lembert silk sutures were put in at the one pole, where the two parts of the button seemed to separate a little. Then the parts were dropped back and the abdominal wound closed, the patient made a good recovery. He passed the button on the tenth day without any difficulty. The button measures two and a half by five-eighths inches. The faecal fistula did not close so far. The benefit derived from the operation till date is that the patient has a normal movement of the bowels every day. Formerly he was continuously constipated, drugs were needed to produce defecation. He has gained fifteen pounds since the operation.

THREE CASES OF GASTRO-ENTEROSTOMY BY MURPHY'S
BUTTON, FOLLOWED BY RETENTION OF
BUTTON IN THE STOMACH.

DR. WILLY MEYER had intended to present a patient upon whom he had performed gastro-enterostomy by Murphy's button on August 23 this year. But he had died from acute cheesy pneumonia three days ago. He now was able to show the very interesting specimen. The man was thirty-nine years of age, had had stomach trouble for nearly a year, had come under the care of Dr. Max Einhorn, of this city, who made careful examination of the stomach contents a number of times, and made the diagnosis of cancer of the pylorus, based on so-called ischiochymia, a term introduced by Dr. Einhorn, and absence of hydrochloric acid. No tumor, however, could be felt. Dr. Meyer was requested to operate. The liver overlapped the stomach, but was not adherent to it. The pylorus was found constricted by a new growth, as had been predicted by Dr. Einhorn. It had been Dr. Meyer's intention to resect the tumor. But there were a number of infiltrated glands in the greater omentum; and on following down the gut he came to another growth at a distance of twenty-six inches from the pylorus. Consequently he abandoned the idea of making resection, and instead united the gut with the stomach anteriorly, according to Woelfson, by means of Murphy's button. The patient was making an ideal recovery until the seventh day, when he was suddenly taken with excruciating pain in the abdomen and vomiting. Thin passages followed administration of small doses of calomel, proving that there was not obstruction of the colon by pressure, and it was concluded that the sudden illness was due to the button falling into the stomach instead of passing on into the intestine. The vomiting, pain, and feeling of weight in the stomach gradually ceased, however. The patient remained in the hospital for a time, gained in weight sixteen pounds within two weeks. Then he began to cough and to expectorate. Tubercle bacilli were found in the sputum. Formerly the man had always been healthy, there was no family history of tuberculosis. It evidently was a hospital infection. Acute cheesy pneumonia developed, which led to death three days ago. Patient was able to eat and drink until his death. He did not vomit, had no pain in the stomach. Post-mortem showed the button in the stomach, as had been diagnosed.

Dr. Meyer had performed gastro-enterostomy with Murphy's but-

ton in another case of cancer of the pylorus, and this patient also was taken with some pain and vomiting on the sixth day, the symptoms continuing two or three days. Five weeks after leaving the hospital the man died of thrombus of the femoral vein becoming detached and probably entering the lung. It was probable the button in this case also had fallen into the stomach and given rise to the symptoms named, for it had not passed per rectum during the three weeks the patient remained in the hospital. Dr. Meyer said it was only natural that the button should fall into the stomach on becoming loose about the seventh day, the gut having been attached to the anterior wall of the stomach and the patient still lying on his back. For this reason he would hereafter follow Von Hacker's method, and attach the gut to the posterior wall of the stomach. In his first case of pylorotomy he attached the outer end of the duodenum to the posterior wall of the stomach, and the button, of twenty-eight millimetres diameter, was discharged per rectum with ease on the twenty-first day after the operation.

The specimen showed the opening exactly the size of the button, its edges were soft. It was Dr. Meyer's opinion there would have been no contraction even had the patient lived many months instead of only three.

DR. W. W. VAN ARSDALE related the case of a man, forty-six years of age, upon whom he had operated in July, 1894, for the relief of carcinoma of the stomach. On opening the abdominal cavity a large tumor of the pylorus was found, spreading in the walls of the stomach and duodenum; with the involvement of numerous lymphatic glands.

The stomach was incised sufficiently to admit a finger for exploration of the posterior wall. The small intestine was then pulled up through the meso-colon transversum into the cavity of the lesser omentum, and attached to the posterior wall of the stomach by a small-sized Murphy's button. The condition of the patient not warranting delay, the abdomen was closed by silkworm-gut sutures.

Patient died ten days later from inanition; had no pain; vomited once on ninth day. Had had rectal feeding for three days.

Autopsy revealed a large anastomosis; no peritonitis. The button was found in the stomach. Cause of death. Perhaps due to knuckle of intestine becoming constricted in the opening in the meso-colon.

CARCINOMA OF COLON; LATERAL BUTTON ANASTOMOSIS; RECOVERY; LATER RESECTION WITH
END-TO-END BUTTON; ANASTOMOSIS;
DEATH.

DR. R. ABBE related the following case: A woman was admitted to hospital with history of ten days' complete obstruction of the bowels with vomiting only of bile and food. Her previous history was negative, her bowels having always been free.

April 25, 1894, a median laparotomy was done. The small intestines and colon were found distended with fluid fæces and gas and greatly congested down to the lower end of the descending colon. The sigmoid flexure was empty. A small, solid, cylindrical carcinoma limited the distended gut just above the sigmoid. The patient was not in condition to endure a resection, owing to the ten days' obstruction, for which reason a lateral anastomosis above and below the cancer by Murphy's button was accomplished.

The time taken for the anastomosis work was not less than twenty-five minutes, owing to the necessity of evacuating considerable fæces and cleansing the soiled gut.

The abdominal wound was closed tightly. Several good movements ensued the following day. Considerable delirium ensued, with tenderness over the site of the anastomosis, for which ice-coil was used. Convalescence progressed after the end of a week, but the button never passed from her.

Six weeks later, the patient having been about and out driving, an operation was undertaken to resect the cancer, as considerable pain was experienced in the side. A six-inch incision was made to the left of the rectus.

The anastomosed gut was found fixed by adhesions. Section of the gut below and above this point was made, and the end-to-end anastomosis made by a large button, which fitted rather snugly in the lower end. This new anastomosis was dropped back into the belly, and the diseased portion excised.

The cancer was not free, as when felt six weeks before, but had grown to and invaded the *lumbar* wall.

A lumbar counter-opening was therefore made, and the anterior wound closed.

The patient was not in very good condition after operation, and on the next day a saline venous infusion was given.

She vomited a little and had pain for some days.

On the fourth day fæces appeared at the lumbar wound.

On the sixth day a free opening of the wound anteriorly revealed sloughing of the intestine on either side of the button, and extravasation of fæces in the region though not into the peritoneum.

On the seventh day she died, exhausted, though free fæcal evacuation occurred at the wound.

RESECTION OF CAPUT COLI AND ASCENDING COLON
FOR CANCER; ILEO-COLIC ANASTOMOSIS BY
MURPHY'S BUTTON; DEATH.

DR. ABBE also related the history of a man, J. H. C., forty-two years of age, who, after having had for one year symptoms of iliac fossa pain, presented a hard nodular mass in the caput coli region with pain but no obstruction. Symptoms of appendicitis led to operation by Dr. Murray, June 7, 1894, but this resulted in finding a shrunken appendix tied down by lymph, which was removed.

A cancer mass just above the caput coli was discovered, and the patient allowed to recover until resection was deemed best.

Pain, fever, and cachexia continuing, he was operated on by Dr. Abbe, July 11 following. The growth, with five inches of the colon, including the complete caput coli and three inches of the ileum, were resected with almost no hæmorrhage.

An end-to-end anastomosis of the ileum and colon was made easily with a medium-sized, easy-fitting, Murphy button.

At the end of the second day he had grown restless; temperature 100° F.; had pain in abdomen, tympanites, and vomiting. He had a strong and repeated desire to defecate, but was unable to, even with the aid of a high enema. Hiccough set in on the third day. Saline cathartics had been given without effect. On the third day, nausea and hiccough continuing, the wound was opened, and the greatly-distended ileum incised after suturing to the abdominal wall. A large amount of fluid fæces escaped and gave great relief. By evening hiccough and nausea ceased.

On the following day vomiting and delirium set in, and on the sixth day he died. The temperature had remained low, but rose to 101° F. before death.

Autopsy showed no peritonitis, but an empty colon below the button and a hard plugging of fæces in the button, which formed complete obstruction.

CHOLECYSTENTEROSTOMY BY MURPHY'S BUTTON.

DR. ABBE said also that in October, 1893, he did a cholecystotomy for profound cholæmia and exhaustion, which had progressed painlessly for four months, the patient being a woman, forty years of age.

He found a small hard tumor of the common duct. Subsequently she discharged daily one pint of bile through the fistula, and gained health.

On February 20, 1894, he reopened the abdomen, and found general adhesions about the gall-bladder. There was but little increase in size of the tumor. He thrust needles into it to search for stone, but these entered it as if it were a hard cancer throughout. He then united the duodenum and gall-bladder with little trouble by a Murphy button. Perfect recovery ensued.

Five months later she had one day a bilious colic, and quite recently (October 20) had had a similar attack.

END-TO-END ANASTOMOSIS OF THE ILEUM BY
MURPHY'S BUTTON.

DR. WILLY MEYER presented the specimen from the case which he had related in May, and operated upon March 3, for tumor of abdominal wall extending to and obstructing the gut. Tumor and adherent gut were cut out in one piece at that time, and anastomosis was made by Murphy's button. The patient died ten weeks later of acute intestinal hæmorrhage. Post-mortem showed metastatic growths all over the intestine and manifold adhesions. The point of anastomosis could be detected only by the presence of a few silk stitches which had been inserted during the operation. There was not the slightest contraction. The linear cicatrix was about three millimetres wide. The anatomical result is ideal.

DR. MEYER also remarked upon possible danger of gangrene from use of a button of too large size, and of obstruction if one too small were used on the large intestine. It had been his custom to commence feeding by the mouth within twenty-four hours after the operation, and he had had no cause to regret it. He would propose, in using the button on the large intestine, to begin with repeated small doses of a cathartic on the third or fourth day. It seemed that obstruction of the central canal of the button by hardened faecal matter might thus be avoided. He had used the button in eight

patients, all of whom recovered as far as the operation with the button is concerned. Among these eight operations one had been done on the ascending colon and one on the rectum. He had not experienced obstruction. In both cases the button was passed on the eleventh day. He was unable to understand why the button should have fallen back into the stomach in Dr. Van Arsdale's case where posterior anastomosis had been made according to the method of Von Hacker. He thought that after a number of cases treated in this manner should come to be recorded, this one, in which the button had failed to pass downward, would be found to be an exception.

DR. ABBE thought the falling back of the button into the stomach was a matter of some importance. One patient he had operated upon did not pass the button, and it was found six weeks later to have fallen back into the loop of bowel on the proximal side of the union. In end-to-end anastomosis between portions of the gut and in cholecyst-enterostomy it was uniformly swept on. Might it not give rise to trouble as a foreign body should it remain long in the stomach? The method of anastomosis was certainly an easy one, and destined to have a wide field of application, although further experience might narrow its boundaries in some directions. The button-method possessed two important advantages, one being that a disk of the intestine was punched out; the other that the line of pressure gave a narrow cicatrix and comparative freedom from contraction. In the case of cholecystenterostomy, which he had related, it was probable some contraction had already taken place. It was a mistake to make the buttons too large. He thought a button one inch in diameter for the colon was plenty large, even for end-to-end anastomosis, if one could be assured against contraction. The use of too small a button in the colon was also a mistake, as had been shown in one of the cases related. It was evident a fatal issue would not have resulted had the fæces been able to pass through the lumen of the button.

DR. KAMMERER mentioned a case which demonstrated that the button might go the wrong way, not only in operations upon the stomach, but also upon the intestine. It was in a case of fæcal fistula at St. Francis's Hospital, the fistula having resulted from gangrenous hernia, anastomosis made with the button about one foot above the fistula by Dr. Murphy himself. When Dr. Kammerer, who was in Europe at the time, took the service about thirteen weeks later the button had not been passed, but could be readily reached from the fæcal fistula which still persisted. He enlarged the fistula, taking

pains not to open the peritoneum, and after much trouble succeeded in extracting the button. The patient did well for six days, then suddenly the temperature rose, and she developed symptoms of subacute peritonitis and died. The post-mortem examination, which the speaker was unable to attend, showed general peritonitis. The anastomosis separated, while the bowel was being removed, without any force having been employed, and the sharp edges of the incisions into the bowel showed that the adhesions, even after thirteen weeks, must have been very slight,—perhaps an advantage of the method. The speaker did not believe that the peritonitis was due to a separation at this point, but another cause for it was not apparent.

The tendency of the button to fall back into the stomach had led Dr. Kammerer to prefer suture in gastro-intestinal anastomosis; in certain cases of intestinal anastomosis, and especially in cholecystenterostomy, he thought the button, which was a very ingenious mechanical device, could be employed with great facility.

LARGE SARCOMA OF KIDNEY IN A CHILD; NEPHRECTOMY; RECOVERY.

DR. W. B. COLEY presented a child and photographs, illustrating the appearance before and after nephrectomy for large sarcomatous kidney. The patient, a little girl aged five years, was operated upon September 25. An incision four inches long was made parallel with the rectus abdominis, and was met by a shorter transverse incision at right angles to the vertical; the tumor was adherent to the overlying colon and other structures, but could be shelled out. Only two or three ounces of blood were lost, and there was but slight shock. The pedicle was not larger than one's little finger, was ligated with silk, gauze drain was introduced outside of the peritoneum, and along its track there still existed a small sinus. The patient had gained in flesh and strength, and in view of the success attained in two similar cases by Dr. Abbe there was reason to hope the cure would prove permanent. The tumor proved to be a spindle-celled sarcoma, and weighed three pounds.

EXTRAPERITONEAL URETERO-LITHOTOMY.

DR. CHARLES K. BRIDDON then read the paper of the evening, entitled case of "Extraperitoneal Uretero-Lithotomy, following Nephro-Lithotomy and Nephrectomy." (See page 29.)

DR. CHARLES MCBURNEY had had a case not long since in which the calculus rested in the lower part of the ureter, the diagnosis having been made without much difficulty per rectum. Suprapubic cystotomy was performed, the bladder was opened widely, a curved probe-pointed dilator was used to stretch the lower end of the ureter large enough to admit the tip of the little finger, the calculus was reached, was broken up into fragments, and when removed weighed altogether 130 grains. The operation was slow, but no injury was done any of the tissues. The ureteral orifice would have permitted even wider dilatation than was made. The patient had been well since.

DR. BRIDDON remarked that Dr. Emmet had in several cases removed calculi from the ureter through the vault of the vagina. Several cases had also been reported in which the stone had been taken out by suprapubic incision, but only where it lay close to the orifice of the ureter. In his own case the stone was situated higher. The suprapubic operation was not without danger even where the stone was within reach through the orifice, unless in the hands of the very expert, for one case was on record in which the peritoneum had been opened, resulting in fatal infection, and in his judgment the preferable method in such cases would be to attack it from behind by the modification of Kraske's sacral resection modified by Cabot, of Boston.

PROCEEDINGS OF THE SURGICAL SECTION OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Stated Meeting, October 12, 1894.

JOHN B. ROBERTS, M.D., President, in the Chair.

AN IMPROVED LITHOTRITE.

DR. W. S. FORBES exhibited an improved lithotrite, and demonstrated the method of testing and measuring the strength of lithotrites, as well as the measured crushing resistance of vesical calculi.

This new lithotrite somewhat resembles the Civiale, Thomson, and Bigelow instruments in general shape, and in having a movable male blade. As regards the mechanism and construction, the Forbes instrument is entirely different. In the first place, in the cross section of the female blade of usual construction, the groove is shaped so that when great force is exerted the tendency is to spread apart the sides of the groove, allowing the male blade to rise up. In the new lithotrite the groove has a V-shaped or dove-tailed flange on each side, so that this accident cannot occur. The shank is stronger, the bulk of the metal being put above the slot. The septum of the male blade is unusually thick. The shoe of the female blade is spread so that it will not catch the wall of the bladder, and also to allow the *débris* to come out. The surface of the male jaw presents a median cutting edge bevelled to each side, with two cross ridges on the surface to prevent bursting a stone and injury to the bladder by flying fragments. The spur rises to an unusual height on the male jaw for greater strength. The handle of the instrument is entirely new. The instrument is unlocked by simply turning the handle half a turn to the left, which releases the male blade; it is immediately locked by reversing the motion of the handle. The thread on the screw has the advantage of increasing the power and of giving the stone time to break without unduly straining the instrument.

The handle or screw mechanism belongs to what is known as the interrupted screw-type. It consists of an internally screw-threaded barrel having the threads cut away the entire length of the barrel at alternate spaces of ninety degrees each.

This screw-barrel has an end movement in the cylindrical handle of about one-sixteenth of an inch. Working in this barrel is a pair of screw-blocks, likewise having their screw-threads interrupted at alternate spaces of ninety degrees each. Thus the screw-blocks may be slid up and down the barrel without the threads engaging. When it is necessary, however, to apply the power, the screw-blocks are turned by means of the screw-handle, and the threads engage immediately. One screw-block is rigidly keyed to the screw-handle shaft, and the other is so formed that it may have a motion of ninety degrees around the screw-handle shaft. Thus, when the screw-handle shaft is turned to the right the screw-block that is rigidly attached to the shaft is brought into mesh with the threads of the screw-barrel, and a further turn of the handle of ninety degrees brings the rotatable screw-block also into mesh. The screw-threads on these two blocks are, therefore, now no longer interrupted, relatively to the barrel, but continuous, and we have in substance a solid plug, or screw-block, engaged with the threads in the screw-barrel. As long as the screw-handle is turned to the right this state of affairs continues, and the male jaw is propelled towards the female jaw. After the calculus is crushed the instrument may again be unlocked and the jaws separated by turning the screw-handle to the left until it stops. This left-hand motion is never more than half a turn. Owing to the sixteenth-inch play of the screw-barrel in the cylindrical handle it readily adjusts itself to engage with the thread of the screw-block, and the calculus is, therefore, never dropped in locking the instrument. The screw-handle has been made larger than heretofore, because it aids the easy and gentle manipulation of the instrument. The shape of the handle is also different, and calculated to serve its purpose. Being made of very thin sheet-metal it is at once strong, and as light as the lightest handle now employed, which is, perhaps, the soda-water-fountain wheel of Thomson or Civiale. To sum up this instrument, it may be likened to a chain in which each link is of equal strength, and that means the maximum strength for a given size and weight, or, in other words, a correct disposition of metal.

On testing this instrument it was found that up to 600 pounds it

would not suffer any injury, the blades yielded a little at this point, but regained their original position by the natural elasticity of the metal when the strain was removed. Above this point they did not spring back. But it was found that this amount of pressure was more than could be obtained by the hand, and therefore this accident would not occur in an operation. Moreover, it was found that the blades closed completely, and could be withdrawn from the bladder. The greatest power exerted simply by the hand with this instrument was 540 pounds. While not sufficient to injure the lithotrite, it is more than sufficient to break any stone occurring in the human bladder.

The screw-thread is large, but is a slow thread. It was found that a stone might resist a pressure for a moment, but then it would break without increasing the force. There is an advantage, therefore, in a slow thread, as it gives the stone time to break, as well as increases the power. There is a great loss of power in friction in all lithotrites. In this instrument the friction is greater, but the actual amount of force nearly double that exerted by the ordinary patterns with which it has been tested and compared.

THREE CASES OF ABDOMINAL SECTION FOR GUNSHOT WOUNDS.

DR. ROBERT G. LE CONTE reported the following case: An Italian laborer, aged thirty-five, was brought into the Pennsylvania Hospital at 7.30 P.M., August 2, 1893, in a condition of profound shock. He had received four wounds from a 38-calibre revolver. The first had penetrated the abdomen in the left lumbar region, on a line with the umbilicus; as he turned to run away he received a second in the left side, between the twelfth rib and the crest of the ilium; the third penetrated the back in the left lumbar region; and the fourth passed through the right arm at the upper third. Hypodermics of strychnine and digitalis were given, with external heat, etc. When his temperature began to rise he was immediately placed under ether. The abdomen was opened in the median lines, and the cavity was found full of blood. Fifteen perforating wounds of the intestine were brought together with fine silk by means of the Lembert suture, and four wounds of the mesentery, in which the bowel was not involved, were stitched together, besides a few nicks in the bowel which had not penetrated to the mucous coat. A hasty examination

of the spleen, stomach, and liver was made, and as far as he could tell they had not been wounded. As the urine came clear from the catheter it was inferred that the kidneys had not been touched. The abdominal cavity was then flushed out with warm, distilled water that had previously been boiled, until the fluid ran clear, a glass drain inserted, and the abdomen closed with silkworm-gut sutures, the fascia being brought together with a continuous catgut suture. During the etherization the patient's condition was very bad, and hypodermics of strychnine and digitalis had to be repeatedly given. The operation lasted not quite two hours. At the conclusion his temperature was $97\frac{4}{5}^{\circ}$ F. and the pulse was almost imperceptible. The treatment consisted of strychnine, brandy, and digitalis by hypodermic, and nothing was given by the mouth. At 3 A.M. the temperature had risen to 101° ; pulse 96 and weak; respiration 30. He was delirious and very restless, and had to be strapped and morphine given. At 10 A.M., his condition had improved. Temperature had fallen to 99° ; pulse 110 and stronger; respiration 24, and he was quiet and his mind was clear. During the night the glass drain had been sucked dry every ten or fifteen minutes with a syringe, and the quantity of blood or bloody serum withdrawn amounted to about an ounce an hour. This gradually diminished to half an ounce by morning; urine was passed free from blood.

At 4 P.M. his temperature was $98\frac{3}{5}^{\circ}$, pulse 114, and respiration 22. The abdomen was moderately distended, and there was frequent belching of wind, but no vomiting. No flatus had been passed. Towards evening the temperature began to rise, the pulse became weaker, delirium set in, and the patient slowly grew worse until death intervened, the next day at noon, thirty-seven hours after operation. At the post-mortem examination, made by the coroner's physician, two of the bullets were recovered; one had entered the liver from behind, passed through it, and lodged in one of the short ribs on the right side; the other was found just under the omentum near the stomach. None of the stitches in the intestines had given away, and no extra perforations of the bowel were found.

DR. LEWIS W. STEINBACH detailed a second case, as follows: A. H., aged thirty-six years; white; a Philadelphia police sergeant, was admitted to the Polyclinic Hospital August 30, 1894. Twenty minutes previous to admission he had been accidentally shot in the abdomen by a 44-calibre pistol.

His temperature on admission was 98° , pulse 60, respirations 28. He was weak and faint, although externally he had not lost much

blood. With the assistance of two officers he had walked from the place of shooting to the hospital, comprising several blocks.

Patient complained of some pain around umbilicus, and was unable to void his urine.

The history obtained from the patient states that he was sitting in a chair while the person who shot him was standing to his right, the pistol pointing slightly to patient's left. On examining the abdomen a small wound one-quarter inch in diameter was seen two inches below and to the right of the umbilicus.

After cleansing the part, a probe was gently inserted into the wound, and it was probed in all directions. The muscles had been torn up in several directions, so that this was not satisfactory, although there seemed to be a track in an upward direction and to the left, which from the history seemed to be the true course which the ball had taken. A small quantity of sterile water was then injected into the wound; but, as it returned, it could not be made out that the abdominal cavity had been entered, although this was what was thought to be the case.

Patient was etherized, and after all antiseptic precautions had been taken, a grooved director was introduced into the wound, and after some little trouble, as the track was irregular, it was laid open to about an inch in extent. Upon pushing the director further it entered the peritoneal cavity. A three-inch incision was then made in the median line, and upon opening the peritoneal cavity a considerable quantity of blood escaped through the wound. The intestine was carefully examined, and nine perforations made by the bullet were found. These were principally in the lower part of the jejunum and the ileum. One was wholly in the mesentery, while the others chiefly lay at junction of it with intestine; and it was from these that the greater part of the blood was oozing. The colon was not perforated.

The various perforations were sutured with Lembert suture, silk being used. After carefully going over the small intestines they were replaced, and the abdominal cavity thoroughly washed with warm sterile water until all blood and clots were removed, and the fluid returned clear. A glass drainage-tube was placed in the lower part of the wound, and silkworm-gut sutures introduced, closing the incision. The ordinary antiseptic dressing was applied.

The bullet had not been found, but was thought to have taken an upward course to the right of the spinal column.

The operation was a long one, and it was found necessary to administer strychnia and atropia to combat the shock. Temperature after operation was 99.8° ; pulse, 120; respiration, 28.

The patient came out of the ether and seemed to rally; but, during the evening, his pulse became weak, thready, and very rapid, reaching 156 by 9 P.M. The temperature kept rising slowly and steadily until 3 A.M. it reached 102.4° . About four ounces of fluid blood and serum were obtained through the drainage-tube. It did not clear, though it lessened in quantity towards morning. It was also noticed that the patient coughed up a small quantity of a dark chocolate-colored fluid. Stimulating treatment was kept up during the night. He complained greatly of thirst, was extremely restless, it being with difficulty he was restrained in bed. But at no time did he complain of pain.

The pulse became weaker and weaker, and at 8.36 o'clock, the morning following operation, he died. Temperature taken half an hour previous to death registered 105.6° .

An autopsy was held by the coroner, and it was found that the bullet had pursued an upward course after striking the spinal column, passing beneath the diaphragm, rupturing some of the vessels at the root of the right lung, which was engorged with blood. The right pleura was filled with blood. There was also blood in the abdominal cavity, due to rupture of small vessels in liver tissue. The intestines looked ecchymotic in places; but the places that had been sutured showed commencing union. The bullet was not found, but traced to muscles of the back.

DR. THOMAS S. K. MORTON reported a third case, as follows: A boy, aged nine and a half years, was admitted to the Pennsylvania Hospital, September 11, 1894, with a history that he had been shot by a 32-calibre revolver, at short range, but a few moments previously. Dr. Morton saw him almost at once after admission, and found a bullet wound one-and-a-half inches below and half an inch to the left of the ensiform cartilage. He was not especially shocked. Was said to have vomited considerable blood, and complained of great pain in the epigastrium. Abdomen not distended.

Ether was administered and perforation of the abdominal cavity proved by enlarging the bullet-wound slightly and passing a probe. Having thus made certain that the peritoneum had been entered, an incision was made in the median line from the ensiform cartilage downward for four inches. Upon laying open the peritoneum much

fluid blood and some large clots flowed out. It was found that the ball had passed through the right lobe of the liver, two-and-a-half inches behind the anterior margin, then emerged just above the gastro-hepatic omentum, had almost totally destroyed the lobus Spigelii, then had torn a large hole in the lesser omentum, again perforated the peritoneum, struck the first lumbar vertebra, and become lost. Blood welled up in large quantities from the posterior peritoneal opening, mostly venous, but partially arterial. A finger-tip only could be passed into this wound. There was no wound of stomach or intestines. The wound of the right lobe, as well as that of the Spigelian lobe of the liver, was not bleeding. A column of iodoform gauze was carried down so as to block the wounds of the lesser omentum and posterior layer of the peritoneum, and at the same time to press upon the mutilated Spigelian lobe and posterior or exit wound of the right lobe of the liver. The packing was continued and brought out through the parietal wound. The wound of entrance into the right lobe was not interfered with. The abdominal wound was now closed around the gauze-drain after copious irrigation of the surroundings with hot salt solution. As it was suspected that much blood had gravitated into the pelvis and lower portions of the abdomen, which could not readily be washed out by irrigation from above, it was determined to make a small opening above the pubis for that purpose and to put in a drain-tube. Accordingly a half-inch incision was made just above the symphysis, and much fluid blood and clots were washed out through it by means of a long irrigator tube. A glass drain was carried through this wound down to the bottom of the pelvis, to serve as an index should further hæmorrhage take place into the abdomen. But, despite all efforts to the contrary, the lad died in a few hours.

At the post-mortem examination it was discovered that the ball had passed between the aorta and vena cava, and perforated the right crus of the diaphragm before striking the first lumbar vertebra. In the latter it cut a large groove, and was deflected upward and outward through the pleura, and into the substance of the right lung, where it was found embedded. The lower lobes of this lung were distended by blood, and over a quart in addition filled the pleural sac. No wounds of other viscera were discovered. There was no blood in the abdominal cavity.

EDITORIAL ARTICLES.

GUY DE CHAULIAC AND HENRI DE MONDEVILLE,— A SURGICAL RETROSPECT.

It cannot be otherwise than profitable to turn aside for a moment from the feverish struggle for the new, in which modern surgeons are commonly engaged, and to glance in leisurely fashion at the works of the Old Masters. He who renders the classics more accessible to us, then, is as truly a benefactor as he who adds a new fact to our fund of professional information. In producing his magnificent new editions of the works of Chauliac¹ and Mondeville,² M. Nicaise, the distinguished French surgeon, has laid us doubly under obligations. The medical profession is proverbially practical, however, and it is to be feared that too few will appreciate the great value of M. Nicaise's

¹ LA GRANDE CHIRURGIE DE GUY DE CHAULIAC, chirurgien, maître en médecine de l'université de Montpellier; composée en l'an 1363; revue et collationnée sur les manuscrits et imprimés latins et français, ornée de gravures, avec des notes, une introduction sur le moyen âge, sur la vie et les œuvres de Guy de Chauliac, un glossaire et une table alphabétique, par E. NICAISE, professeur agrégé à la Faculté de médecine de Paris, chirurgien de l'hôpital Laënnec, ancien membre du Conseil de surveillance de l'Assistance publique. Paris: Félix Alcan, 1890. Imp. 8vo, pp. 939.

THE GREAT SURGERY OF GUY DE CHAULIAC. Composed in 1363. Edited by E. NICAISE, Adjunct Professor, etc.

² CHIRURGIE DE MAÎTRE HENRI DE MONDEVILLE, chirurgien de Philippe le Bel, roi de France, composée de 1306 à 1320; traduction française avec des notes, une introduction et une biographie, publiée sous les auspices du Ministère de l'Instruction publique, par E. NICAISE, professeur agrégé à la Faculté de médecine de Paris, chirurgien de l'hôpital Laënnec, etc., avec la collaboration du Dr Saint-Lager et de F. Chavannes. Paris: Félix Alcan, 1893. Imp. 8vo, pp. 986.

SURGERY OF MASTER HENRI DE MONDEVILLE, Surgeon to Philip the Fair King of France. Composed between 1306 and 1320. French Translation with Notes. By E. NICAISE, etc.

work. The American profession is particularly devoted to the practical side of its work. Said a prominent medical publisher, "I have sunk thousands of dollars trying to educate the taste of the medical profession, and it don't pay. Hereafter I shall publish only books that teach means of filling the professional pocket, and in that way contribute to my own." And yet while the great mass of the profession is absorbed in the chase after the fascinating Almighty Dollar or the elusive Bubble Reputation, there is a considerable and increasing number of scholarly fellows who are glad to occupy leisure hours in going back to the beginnings of medicine and studying the views of the founders of our art. The writer knows of the existence in private American libraries of manuscript translations of a number of antiquarian medical works of the greatest historical value, none of which have ever before been rendered into English. Prepared simply as a recreation and without thought of publication, they remain buried in their translators' book-shelves, profitable to none but their owners. In older countries there seems to be more demand for the works of the Fathers, although England could not permanently maintain the Sydenham Society. A number of books relating to antiquarian medical literature have appeared of late years in France, while Langenbeck's Archives published the Latin text of one author as a serial, and still others have been published latterly in several of the German-speaking countries.

Neglect of the writings of the Fathers is liable to give rise to singular historical errors, later authors not infrequently claiming credit for the discovery of procedures known long before their day. The grand old Huguenot, Ambroise Paré, had long been acknowledged as the Father of Modern Surgery, and particularly of French surgery, so that it was something of a shock when in 1890 M. Nicaise's fine edition of Guy de Chauliac emphasized the fact that a century and a half before the time of Paré a surgeon of Avignon had anticipated him in much of his best work. And hardly had we resigned ourselves to transfer to Chauliac the title hitherto accorded to Paré, when a royal edition of Mondeville issues forth to show us

that we were still at fault, and that Mondeville reached out and grasped the laurel before Chauliac had begun to teach.

While the exact date of the birth of GUY DE CHAULIAC is wrapped in obscurity, he was probably born in the later years of the thirteenth century. According to the custom of the day he adopted as a surname the name of the village in which he first saw light—the hamlet of Chaulhac, in the diocese of Mende, on the frontiers of Auvergne. Thus he has been called Gui de Chaulien, Guido de Cauliaco, Guido, Chauliac, and more commonly Guy de Chauliac. If the evidence of the documents of the cathedral chapter of Saint Just, of which he was provost, be accepted as authority, however, he should be called Guigo de Chaulhaco. The village still exists on a plateau of Mont Morgerine in Gevandane. The parish of Chaulhac was a dependent of the Barony of Mercœur, an ancient and illustrious house which was overthrown by Charles IX in 1567.

It was doubtless a noble lady of this family who, tradition says, was thrown from her horse, sustaining a painful fracture, while engaged in the chase. The efforts of the healers of the neighborhood were of no avail in her treatment. Finally an old sorceress was consulted, who made response, "She shall be cured by an unlettered rustic." This was interpreted to refer to a farmer's boy of Chaulhac, who was bidden to the castle of the patient, and such was the natural skill of the boy that ten days later the châtelaine was able to repair to the church to give thanks to the Holy Virgin for her recovery. The young peasant was called Guy, and his conduct so pleased the seigneur that he was taken under the protection of the family, the legend continues, and given every advantage for the prosecution of the study of healing.

He pursued his studies with energy, entering upon his medical education at Toulouse. Later he resorted to Montpellier to continue his work under Raymond de Molières, who was chancellor of the university in 1334. It is probable that he also sat under the instruction of a surgeon in that city; but as the Faculty of Medicine at that time considered surgery to be a mechanical trade, to engage in which

would be indecorous in a professional man, it was not taught in the university, and he was doubtless driven to prosecute that study in one of the independent extramural schools which flourished many years in Montpellier. Bologna had been rendered famous by the human dissections inaugurated by Mundinus and continued by his successor, Nicholas Bertrucius, and Chauliac journeyed thither to perfect his knowledge of the human structure. Finally he completed his surgical studies at Paris, although he did not arrive there until after the deaths of Lanfranc, Pitart and Henri de Mondeville had weakened the surgical instruction available in that city.

Guy de Chauliac was not a doctor of medicine, for that title did not exist in France in the fourteenth century, neither was he a barber, as were most of the surgeons of the day. He became a Clerk and later a Master in medicine, which was the highest medical degree granted at that time, and conferred only after years of study. It has been stated that he lectured on surgery at Montpellier, but this is an error, for the sentiment of the university would not have permitted what would have been considered such a degradation of the curriculum; what he did was simply to deliver certain lectures on medicine to satisfy a requirement preliminary to the attainment of the master's degree.

It is more than probable that Guy de Chauliac took holy orders, for he refers to himself as "Household Physician and Chaplain of our lord, the Pope." Moreover, in 1344, he was a canon of the cathedral of Saint Just, in Lyons, and in 1353 he was appointed canon of Riems, a post which he held until five years later, when he was reappointed to Saint Just and made provost of the chapter. The archives refer to him as "*Venerabilis et circumspectus vir, dominus Guigo de Cauliaco, canonicus . . . medicusque domini nostri pape.*" He presided over the chapter of Saint Just from this time until his death. And for a part of the time he was also a canon of Mende, the diocese in which he was born, and which was under the protection of the barony of Mercœur.

When he had taken his medical degrees and had broadened his

views by travels into Italy and possibly Germany and England, he settled down to practise surgery at Lyons. According to custom he made his home a centre from which he radiated from time to time on peripatetic tours in search of patients. His merits received early recognition. Between 1346 and 1348 Europe was devastated by that terrible epidemic of plague which ravaged nearly the whole world, and was commemorated by the Decameron of Boccaccio. Avignon, whither the papal court had been removed by Clement V, was almost depopulated. Guy de Chauliac had by this time been appointed one of the pontifical physicians, and with characteristic fearlessness fought the pestilence regardless of self. He was finally taken down with the disease, from which he ultimately recovered after several weeks of fever, the attack terminating in an axillary abscess. It was this epidemic which carried off the lady Laura, immortalized in the sonnets of Petrarch, who was the poet laureate of the papal court, and it is quite probable that Guy de Chauliac was the medical adviser of that lady. Some authors have thought that he was the subject of Petrarch's letter, "Invective against a Physician," but Nicaise thinks otherwise.

Petrarch states in others of his letters that Pope Clement VI had been trephined. And this fact rendered possible the recognition of his remains three and a half centuries later, when his tomb was opened to ascertain whether or not it had been profaned by the Huguenots. Whether this operation was performed by Guy de Chauliac or not, it is a fact that he was one of the physicians to that pope as shown by an official document dated 1348. This office he retained under Innocent VI until Urban V succeeded to the pontificate in 1362, when he was appointed chief physician to the pope. When Urban travelled to Rome, in 1367, Guy de Chauliac did not accompany him. When he returned, in 1370, Guy was no more, his death having taken place in June, 1368, at Lyons.

The *Chirurgia Magna*, *Grande Chirurgie*, or Great Surgery, was written by Chauliac towards the end of his life, in 1363, as he remarks "as a solace to his old age." He was then about sixty-five

years of age and practically retired from active practice. While he wrote largely from his vast experience, he quoted freely from earlier authors. The teaching of his day was largely oral, the enormous labor of copying manuscripts debarring any but the wealthy from the possession of them. But with the vast revenues of the church and the treasures of the library of the university at Montpellier at his service, he had command probably of a greater number of authorities than any of his predecessors and most of his successors. He was familiar with the works of Galen, Paulus Ægineta, all the Arabians, and the authors of the Middle Ages, although Hippocrates, Celsus, Oribasius, and Aetius seem to have been strangers to him.

The Great Surgery was undoubtedly written in Latin, but it was the Latin of the Middle Ages, a barbarous mixture of the classical tongue with French, Provençal, and Arabic words to which the Latin forms and terminations had been given. Notwithstanding this defect, the style is very clear and concise, and the descriptions are clean-cut and picturesque. He states that surgery comprises three parts :

(1) The topography of the patient,—*i.e.*, Anatomy.

(2) The subject upon which action is required, the condition which demands a cure,—*i.e.*, The Description of Diseases. This part includes five subdivisions, concerned respectively with swellings, wounds, ulcers, fractures and dislocations, and special diseases.

(3) The instruments with which the desired result can be attained, the means to be employed in the cure,—*i.e.*, the Antidotary.

His anatomy is defective and deficient from the stand-point of post-Vesalian students, but it is fully as complete and accurate as that of Mundinus, which remained the recognized anatomical text-book for the next 200 years. It does not appear that he ever practically dissected the human subject himself, but he describes the method in vogue at Bologna. "My master, Bertrucio," he says, "taught in this way: having laid the subject on a table, he made from it four readings; first, he treated of the digestive organs, because they decay the soonest; second, the organs of respiration; third, the circulatory organs; in the fourth he took up the extremities. In every part there

are nine things to see,—*i.e.*, the situation, the substance, the composition, the number, the figure, the relations or connections, the actions, the uses, and the diseases which may affect it. So, from anatomy the physician may gain assistance in learning concerning maladies and their progress and cure. We study anatomy also on bodies dried in the sun, or consumed in the earth, or submerged in running or boiling water: showing the anatomy of the bones, cartilages, joints, large nerves, tendons, and ligaments. In these two ways we must teach anatomy on the bodies of men, apes, swine, and divers other animals, and not from pictures, as did Henrie [de Mondeville], mentioned above, who had thirteen pictures for the demonstration of anatomy."

He counted 248 bones, besides the hyoid and sesamoids, and 531 muscles. He found three ventricles in the brain, each having two parts, and each part having its own particular "virtue;" in the first part of the anterior ventricle dwelt common sensation, and in the second, the imagination; in the middle ventricle thought and reason were enthroned; and in the posterior, memory and recollection sat. He observed seven cranial, and thirty-seven spinal nerves, but he also considered that the cords or tendons partook of the nature of nerves. The anatomy of the arm taught him that incisions there should be made lengthwise, for so run the muscles. The veins and arteries, he remarked, differ in function and origin; for the veins arise from the liver, and the arteries from the heart; the veins are the home of the nutritive blood, the arteries are the place of the spiritual blood. The liver, he maintained, was the instrument of second digestion, the generator of the blood. M. Nicaise has enriched his edition with a fac-simile of a miniature illustration from one of the fourteenth century manuscript copies of Chauliac, in which a begowned professor is demonstrating the visceral anatomy of the human subject with a knife two feet long, upon a hydrocephalic giant eight feet in height.

The treatment of wounds, he holds, involves two chief factors: First, Nature, as the chief workman, who works by means of her own peculiar "virtue," and by proper nutrition; and, Second, The physi-

cian who, as an assistant, works by means of five steps, each dependent upon the other,—

First, To remove foreign bodies, if there be any between the divided parts.

Second, To bring together separated parts.

Third, To unite the parts drawn together.

Fourth, To conserve and preserve the tissues.

Fifth, To correct accidents.

He describes five ways of checking hæmorrhage :

- (1) By suture of the wound.
- (2) By tamponnade.
- (3) By compression of a vein.
- (4) By ligature of an artery.
- (5) By cauterization.

For sutures he used silk thread and a needle similar to the modern glovers' needle.

He considered the ligature better adapted to deep arteries. The vessel was denuded, drawn up with a hook, surrounded with a silk ligature, and strongly tied ; after which a healing medicament was applied, and the wound bandaged. He quoted Galen as authority for the statement that the ligature should be applied to the end of the artery nearest the heart, the lower end, if the head or neck be wounded, and the upper end in all other parts of the body.

He used the trephine in fracture of the cranium, although the trephine of his day was not the crown saw of to-day, but a simple auger with which a hole was bored in the bone, and provided with an encircling pad, or pierced by projecting pins to prevent the instrument entering too deeply into the skull.

He discussed renal and vesical calculus at length. But he said that no one should cut for stone in the kidney, and that in the bladder the incision is likely to produce convulsions, hæmorrhage, and fistula. " And for this reason the prudent leave this operation to the *coureurs*," or strolling lithotomists. But he devoted pages to internal medication looking to the solution of concretions in the urinary or-

gans. While he still insisted that an incision of the bladder would not heal, being dangerous to life, he closed his account of vesical calculus by a brief description of the method of operating; placing the patient in the conventional lithotomy position, the stone should be drawn up to the neck of the bladder by the fingers in the fundament, and cut down upon a little to the left of the median line; it was then removed with a hook, and the wound cleansed and dressed, only the neck of the bladder having been divided.

He briefly described the Cæsarean section, in which he held that the child should be withdrawn through an incision on the left flank of the mother. "Thus was born Julius Cæsar, as we read in Roman histories." The operation, he insists, however, should be performed only in cases where the mother has died with a child still undelivered.

The third and concluding part of his work, the *Antidotary*, as he calls it, is a veritable 14th century *materia medica*, replete with obsolete drugs and curious combinations.

The *Great Surgery* of Guy de Chauliac was the acknowledged surgical authority in Europe for two centuries, until it was overshadowed by the more extensive treatise of Paré. For a hundred years it was circulated in manuscript, copies of which remain at the present day. M. Nicaise has been able to locate thirty-four of these, in Latin, French, Provençal, Catalan, English, Dutch, Italian, and Hebrew. Two of them are in the Library of the Surgeon-General's Office, one in Latin, dated 1416, and one in French, dated 1669.

The first printed edition was brought out in 1478, only twenty-four years after the invention of printing. It was the first of seventy editions demanded by the profession during the ensuing centuries. Of these 40 were in French, 15 in Latin, 5 in Italian, 4 in Dutch or Flemish, 3 in Spanish, two in Catalan, and one in English. Of the seventy editions, nine have been lost, not a copy being known to exist. In addition to the complete editions, moreover, there are fragments, commentaries, and epitomes, to the number of sixty more, making a grand total of one hundred and thirty editions.

The first edition, a translation into French from the original Latin, by Nicholas Panis, was printed in 1478, at Lyons, where printing had been introduced five years previously. No copy of this edition is known to be in existence, the earliest extant edition being an Italian translation printed at Venice two years later, and of this the Royal Library at Berlin possesses the only known copy. The earliest existing edition in French is the *Guidon en François*, printed at Lyons in 1485, of which the only known copy is in the Library of the University of Utrecht. Although there seems to be no doubt but that the book was originally written in Latin, it was not until 1490, after an Italian and two French editions had appeared, that Bonetus Locatellus produced the first Latin exemplar; it is lost, however, and the earliest extant Latin edition is contained in a folio bound up with the works of seven other worthies, and issued by the same publisher, at Venice, in 1497.

The last edition, that of M. Nicaise, published in Paris in 1890, contains five interesting introductory chapters on The Relation of the Middle Ages to Science, Medicine and Surgery before the Fourteenth Century, with the authors cited by Guy and their Medical Teachings and Works, Biography of Guy de Chauliac, and a History of Guy de Chauliac from the Fourteenth to the Nineteenth Century, with reference to every edition, and a Historical Résumé for each century. Appended to the work is a valuable glossary, and scattered through it are reproductions, taken from an old manuscript copy of Chauliac, of ancient miniatures illustrative of methods of medical instruction in the fourteenth century.

Among the authorities most frequently quoted by Guy de Chauliac was HENRI DE MONDEVILLE, but writers of later date have almost entirely ignored his work. He was the first French surgeon to write a surgical treatise, but his book was not printed until nearly six hundred years after it was written. His life and his book both passed into oblivion, and now all that is known of the former is contained in the latter. He was born in Normandy, and, according to custom, he added the name of his native village to his Christian name, as did

Guy de Chauliac after him. But the place of his birth is not beyond doubt, and the correct form of his surname is also undetermined. Chereau thought that it was the little village of Mandeville near Caen, but Littré remarks that there is another village in Normandy called Emondeville. Guy de Chauliac refers to Henri as Hermondaville, and other manuscripts speak of him as Mondavilla, Amondavilla, Armandavilla, Amoda villa, and Mundi villa. The author's name appears as Mondeville in the French manuscript of 1314, written in Paris during his own lifetime, and the same spelling is found in the catalogue of the Library of the Louvre of 1373. Hence this form is adopted for the name, although it does not fix the birthplace.

It is not known where he studied medicine, but he probably took his degrees as Clerk and Master in Medicine at Montpellier and at Paris. The degree of doctor had not then been created. He passed over into Italy, where he became a disciple of Theodoric, who then dominated the medical school of the University of Bologna, and taught new practices in the treatment of wounds.

Regardless of the low estimation in which surgery was held, Mondeville studied it with passion. Hitherto no one had done anything for surgery in France, and Mondeville, who seems to have been an independent, enthusiastic, and belligerent character, conceived the notion of elevating its position, as Salicetus, Hugues de Lucques, Theodoric, and Lanfranc had already done in Italy.

The first document referring to Mondeville dates back to 1301, and in it he appears as Surgeon to the King, whom he accompanied, with the queen and the royal family, into Flanders, on a journey lasting from spring to autumn. For the 234 days then passed with the king and the court, and nine days additional, he received forty-one livres, two sols, and four deniers.

Mondeville continued to serve as surgeon to the king up to the death of Philip the Fair, and was retained in the same capacity by his successor, Louis X. These functions were not uninterrupted, but he was called as his services were required by the royal family. He several times accompanied the army, either with the king or the

Count of Valois, and was able to apply Theodoric's method of wound treatment with great success. He complains bitterly that after 1312 he received no pay, and was particularly dissatisfied because of the time lost in accompanying the king to Arras, among the English, and in various parts of the realm with the court or the army.

Mondeville taught medicine at Montpellier, and he is said also to have taught anatomy there in 1304, probably leaving when his duties as surgeon to the king, to which position he was probably appointed on recommendation of Jean Pitart, became too exacting. He continued, however, to maintain friendly relations with Bernard de Gordon who remained in the faculty of Montpellier, and to whose urging, supported by that of Guillaume de Brescia, physician to Popes Boniface VIII, Benoit XI, and Clement V, his book was a response. In 1312 he read the first two parts of the work publicly in the schools, without remuneration and before a great and noble assemblage of students of medicine and other distinguished persons. His *clientele* was numerous as would be expected in one of his high reputation. "Sometimes," says he, "I can hardly write a line a day, having to go to the Schools and to run hither and thither all day long in order to gain my living."

But his health began to decline, as appears in the Introduction to the third part of his book, written when he resumed work upon it, after about four years' intermission. He became a victim of pulmonary tuberculosis, and, during the slow progress of the disease, it became possible for him to complete Part III, all but the third "doctrine" or chapter; and he was too feeble to take up Part IV, which was to have been concerned with fractures and dislocations, but passed on to the Antidotary, Part V, of which, however, he was able to complete only nine of the ten chapters which he had projected. He worked up to the very end, although he had not much confidence in his ability to complete his task, remarking in the introduction to the last part, "I cannot live long, being asthmatic, coughing, phthisical, and in consumption." Thus, with the harness on, in the very act of contributing to the world's progress, died Henri de Mondeville, the veritable Father of French Surgery.

In the fourteenth century, the practice of surgery in Paris was distributed among four classes, the physician-surgeons, the lay-surgeons, the barber-surgeons, and the quacks. Surgery was considered a trade, and to practise it degrading to the Master in medicine. An old miniature reproduced by Nicaise from an ancient manuscript, shows the relative position of the surgeon. It represents a large room with an alcove opening out of it on either side. In the centre stands the physician glorious in robes of state; in the alcove, on his right hand, stands the apothecary, surrounded by his jars and industriously plying his pestle; while in the alcove on the left and a little lower down than the apothecary sits the surgeon in lowly garb, sharpening his knife. In spite of the objectionable position of the surgeon, however, there were some Masters in medicine who had the courage to practise surgery and the ability to command respect, such as Salicetus, Lanfranc, Chauliac, and Mondeville. Lanfranc, indeed, was so highly regarded at the School of Medicine that he was authorized to give instruction in surgery; before that surgery was despised, and in 1350 it again fell into disrepute, and the surgical course was abandoned.

The lay-surgeons were self-admitted mechanics and were formed into a corporation like other tradesmen,—the Brotherhood of Saint Côme and Saint Damien. This was a self-perpetuating body, by which an examining board was selected for the licensing of practitioners of surgery, including barber-surgeons. It is worthy of note that women were admitted to this examination as well as men.

But the lay-surgeons in their turn became consequential and bumptious, holding certain operations to be beneath their dignity; and so the barber became the authority on bloodletting, cupping, extraction of teeth, treatment of sprains, and the like. Phlebotomy had a most remarkable vogue,—men were bled in that day much as they have their hair cut in this. Every one had his barber to whom he intrusted such bleeding as was thought necessary for his health. And so general and frequent was the operation that it contributed great prominence to the barber, and finally a new corporation came to be formed,

that of barber-surgeons or "surgeons of the short robe," in distinction from the lay-surgeons or surgeons of the long robe.

The surgical quacks were numerous, and their vices and crimes formed the subject of many lamentations upon the part of the reputable practitioners of the Middle Ages. Mondeville pays his respects to them in a scathing section of his earlier chapters.

The surgery of Henri de Mondeville comprised a course of instruction more particularly for the first two classes, but available also to the brethren of the short robe, if they desired. The plan of the book included five parts treating respectively of (1) Anatomy, (2) Wounds, (3) All Surgical Maladies except Wounds, Ulcers, and Affections of Bones, (4) Affections of Bones, and (5) the Antidotary. A part of the third and the whole of the fourth part were left undone at his death, the book thus lacking diseases of the eyes and throat and all bone surgery.

Mondeville taught anatomy at Montpellier eleven years before Mondino da Luzzi made the first public dissection of the human body at Bologna. He used for the demonstration of his topic a series of illustrations, at first twelve in number, which he afterwards increased to nineteen. Chauliac refers to them as thirteen in number in connection with a reference to the superior utility of practical dissection.

He considered that all the white tissues partook of the same character, classifying nerves, tendons, aponeuroses, and ligaments together. In this respect he followed the opinion of Galen and others of the ancients. A relic of this supposed nervous character of the tendons remains to the present day in common parlance, as may be seen in the familiar hymn,—

"Awake, my soul, stretch every nerve,
And press with vigor on."

Muscular tissue he considered in two forms, the *lacertus* and the *musculus*, confining the latter term to those which are long, thick in the middle, and smaller at the extremities, and which, says he, resembles a "*mus*" or rat. All others are *lacerti*.

He refers to an alleged cavity in the interventricular wall of the heart as the source of the "*spiritus*," which passes thence into the left ventricle whence it is carried by the blood throughout the body. The arterial blood, then, is the vital blood since it carries life; the venous blood is the nutritive blood since it bears nutrition. The "*spiritus*" changes its name in various organs, being the soul in the brain, the nutritive spirit in the liver, etc.

The circulation of the blood not yet having been discovered, Mondeville naturally failed to understand the lungs, considering that their only function was the refreshment of the heart. But he attributed a most important rôle to the uvula, which he thought prepared and modified the air prior to its entrance into the chest.

In his chapter on amputation of limbs he refers to the ligature of arteries as a recognized procedure, requiring no especial remark, thus giving the last fatal blow to the claim that Paré was the originator of arterial ligation. Mondeville learned of the procedure from the Italians. Celsus refers to it as an ordinary matter; so does Orribasius, who describes the practice of Archigenes, who controlled hæmorrhage by applying a constricting bandage at the root of a limb during amputation and ligaturing the vessels after it.

But the most important feature of the work of Mondeville was the method of treating wounds taught by him, which was revolutionary and progressive beyond his day. For ages, suppuration was regarded as a natural, almost physiological feature of the process of cicatrization. Even at the present day some surgeons maintain that suppuration cannot be avoided in contused wounds.

The ancients believed suppuration to be useful, and, when it did not occur independently, they employed agents to produce it. In treating a wound it was their custom first to cause it to bleed a little, so as to prevent inflammatory complications, then they probed it, enlarged it, and inserted tents or pledgets dipped in white of egg and suppurative agents, covering the whole with bandages. The patient was then subjected to a severe regimen, from which meat and wine were excluded, and a surgical portion called a "*vulnary*" was admin-

istered. Suppuration invariably, and frequently inflammation and phlegmon, followed this treatment.

As early as 1260, Theodoric taught, at Bologna, a modification of this method, replacing suppurative dressings by the application of wine, and establishing certain rules of procedure useful even with the methods of the present day. *Henri de Mondeville went further than his master, and, it is believed, was the first to demonstrate that suppuration was not essential to the healing of wounds.*

Mondeville was accustomed to check hæmorrhage at once; he rarely probed the wound, never enlarged it, nor introduced tents, but, after removing foreign bodies, he closed it by sutures without delay, considering contact with the air to be the chief danger to be avoided. No topical application was employed until after suture, when pledgets moistened with warm wine were applied; he did not wash the recent wound with it. Pledgets well squeezed out in wine were then pressed on the wound so as to take up any moisture that might exude. A bit of cloth spread with an antiseptic plaster (of the juices of plantain, betony, and ache, mixed with clarified resin, wax, and turpentine) was applied over the wound. The pledgets were then opened out, and applied one over the other on each side of the wound, so as to compress its base rather than the line of union. Over these were laid two or three others well moistened with wine, so that the wound was kept continually moist with it. The dressing was concluded by bandaging a large dry compress over the whole. No "vulnary" was given, nor was the diet especially restricted.

Wounds of the intestine he directed to be sutured with silk very closely, as furriers did with skins, fomented with warm wine, dried and sprinkled with a "cicatrizing powder," of equal parts of pomegranate root, pomegranate flowers, and powder of rotted oak wood; then he reduced the gut so that it would lie next to the peritoneum on the other intestines if possible; immediately suturing the external wound lest the cold air should induce suppuration and inflammation in the belly. "I have seen," said he, "wounds of this kind, which had been immediately closed and sutured by modern methods, heal

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in a short time, without pain, and with a single dressing, while similar patients dressed after the old methods had a belly full of pus, and died. This fact needs no comment."

But this Lister of the fourteenth century did not achieve the recognition accorded to his successor of the nineteenth century. He remarks anent his difficulties: "It is dangerous for a surgeon to work differently from his compeers. We have tested Theodoric's method of wound-treatment, Master Jean Pitart and I—who were the first to introduce it in France—having applied it first in Paris, and then in several wars, contrary to the desire and advice of all, particularly physicians. We have been the butt of the sneers and contempt of the laity, and even menaces and peril from our fellow-workers,—the surgeons. So much criticism and violence has been poured upon us by physicians and others that we should have discarded the method, had it not been for the support of the most serene Count of Valois, who with some other personages came to our aid, having seen wounds relieved under our treatment in the field. Furthermore, we have been sustained by truth, but if we had not been strong in faith, physicians of the royal household, and somewhat learned, we should have had to abandon it."

After the death of Mondeville, his method fell into disuse, and Guy de Chauliac, writing fifty years later, rejected it, referring with contempt to Mondeville's teachings on suppuration. And so perished the beginnings of antiseptic surgery, nearly six hundred years before its independent discovery in modern times.

The plan of Mondeville's book is broad and scholarly. Had it been completed, it would doubtless have carried authority equal to that of Chauliac or Paré. He was acquainted with the Greek and Arabian authors, and his text is replete with bibliographical allusions. His statements are clear, and he freely enlarges upon details, so that his meaning may not fail to be understood, even by the most ignorant of barbers. His style is simple, animated, original, and succinct, his work even as it stands forming a valuable treatise of the elementary type upon general surgical pathology and medical deontology.

The Surgery of Henri de Mondeville had not the popularity that was achieved by the Great Surgery of Guy de Chauliac. It was never put in type, except as an antiquarian and historical study at the end of the nineteenth century. Only eighteen manuscripts can be found in the various libraries of Europe. Of these only four—all of which are in the Bibliothèque Nationale, at Paris—are complete, and contain the revised second edition, prepared when the later portions of the work were issued; all of them are in Latin. A complete copy of the Surgery without the anatomy also belongs to the Paris library. The Royal Library at Berlin contains an incomplete copy of this edition of the Surgery. There are three complete copies of the first edition, one each in Latin and French, in the Bibliothèque Nationale, and one in Latin at Erfurt, where a Latin fragment can also be found. Complete copies of the anatomy are found in Paris, Vienna, and Berne in Latin, and in the British Museum in Dutch. There are two abridged Latin copies of the anatomy in Berlin and Erfurt respectively, and two fragments respectively in Paris and Erfurt.

The printed editions are three in number: (1) A reprint of the anatomy alone, by Dr. Pagel, published in Berlin in 1889. (2) A reprint of the surgery alone, by the same editor, published also in Berlin in 1892. (3) The French translation of M. Nicaise, already mentioned, published at Paris in 1893, which is the only complete edition. The value of the latter is vastly increased by an Introduction, in which M. Nicaise sketches Parisian surgery in the fourteenth century, reviews the Surgery of Mondeville, and presents an outline of his biography.

Though Mondeville's work had not the vogue that greeted the treatise of Chauliac, it is no less epochal in character. These two 14th century practitioners equally stand out against the dark background of mediævalism like surgical Titans battling for progress. There is much in common between them. Both of poor and unknown parentage, each achieved fame by his own intrinsic merit. Both completed studies begun in France by work under the greatest

masters of Italy. If Mondeville was surgeon to the kings of France, Chauillac was surgeon to the popes of Rome. Both advocated advances in professional methods derived from their Italian experiences. Mondeville fought for modern methods of wound treatment, and Chauillac advised modern methods of anatomical study. Each was the dominant surgical authority of his day. Chauillac wrote as an occupation for his old age, but Mondeville wrote in spite of an enfeebling disease. Neither knew the joys of paternity, Mondeville was a misogynist, and Chauillac a celibate. His book was the only offspring of each, and to each the world is indebted for a precious legacy of learning and experience that has withstood the wear of centuries in order to come down to us as an inspiration to faithful labor, fearless investigation, original thought, and careful observation.

JAMES E. PILCHER.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

The Treatment of Hydrophobia. By Dr. C. W. DULLES (Philadelphia). The author is of the opinion that the only medication of hydrophobia, which offers any chance of being successful, consists in the use of cannabis indica, hyoscine hydrobromate, one of the synthetical hypnotics, or mixed narcosis. The synthetical hypnotics deserve trial, especially since they do not of themselves tend to produce delirium or mania. With a little ingenuity drugs may usually be administered by the mouth to patients with hydrophobia. When this is impossible, remedies can be administered hypodermically. A hydrophobic patient is not dangerous to his attendants or friends, except as any maniacal patient may do bodily harm. The literature of hydrophobia does not furnish a single trustworthy instance of the communication of hydrophobia from a hydrophobic patient to a human being. A hydrophobic patient should not be tormented with drink or food; the disease does not kill by famishing or starvation. It ought to be the rule in a case of hydrophobia to reduce physical restraint and medical treatment to the very lowest point, and to make no attempts at feeding. Every effort should be made to divert his attention from himself.

The author maintains that Pasteur's inoculations have increased the number of deaths from hydrophobia. He asserts that they have not diminished the number of deaths from the primary disease, but that they have added to them a large number of deaths due to the inoculations themselves. He claims that the reports of Pasteur and his adherents have been manipulated, and points out what he calls the stupendous fallacy of the claim that 1400 Frenchmen were cured by the Pasteur treatment in the year 1893, more persons than have

died from hydrophobia in the United States in a century.—*Reprints from the Therapeutic Gazette and the Medical News.*

ABDOMEN.

I. Intestinal Obstruction following Intra-peritoneal Operations. By Dr. GEORGE H. ROHÉ (Catonsville, Md.). Obstruction of the bowels causes between 1 and 2 per cent. of the deaths following ovariectomy and other operations involving opening of the peritoneal cavity. Sir Spencer Wells lost eleven out of his first series of 1000 cases of ovariectomy from this cause (1.1 per cent.). Fritsch places his mortality from ileus post laparotomiam at 1.6 per cent. Klotz has reported thirty-one cases of intestinal obstruction with five deaths due to this complication in a series of 421 abdominal sections and 148 vaginal extirpations of the uterus. The author has collected in the literature and from personal communications no fewer than seventy-five deaths from this cause. While this number seems large, it probably represents less than half of the deaths properly attributable to this accident, for there can be no doubt that not a few fatal cases of peritonitis and intractable vomiting after laparotomy are really cases of obstruction of the bowels.

Secondary or post-operative intestinal obstruction may be roughly divided into two classes of cases, one due to mechanical causes—adhesions, peritoneal bands, volvulus, accidental fixation by sutures, etc., and perhaps compression in exudation masses—and another due to paralysis of peristaltic movement of the intestines following sepsis or injury to the nerve-supply of the muscular coat. The obstruction may be acute—*i.e.*, occur immediately after or within a few weeks subsequent to the operation—or it may develop gradually and not become complete until months or years afterwards.

The majority of cases in which the cause of the obstruction was ascertained by operation *intra vitam* or by necropsy have been found to be due to abnormal fixation of the intestines by adhesions or to compression by peritoneal cords or bands inflammatory in origin. Obstruction after ovariectomy is often due to adhesions between the

bowel and the pedicle. In addition, the small intestine may become doubled upon itself and so firmly adherent that the gut is entirely impervious. Adhesions of a knuckle of bowel to the abdominal incision or to other portions of the abdominal wall have frequently been found to be the cause of the obstruction, the abnormal fixation causing acute flexure of the intestinal tube.

Another form of obstruction is produced by a coil of small intestine sinking into Douglas's cul-de-sac and becoming fixed there by adhesions. The descending colon has been found glued fast at an angle to the posterior surface of the uterus. A small portion of intestine has become adherent to the abdominal incision behind the edge of the omentum, and another loop has slipped through above this adhesion between the bowel behind and the abdominal wall in front, and has thus become obstructed.

A fold of the bowel has been caught under a suture, and a knuckle of intestine has been found in the incision between two sutures. A case has been reported where a coil of intestine slipped through one of the loops of wire used as sutures for the wound, and was tightly compressed when the wire was fastened. In one case an adherent ovarian cyst, emptied by the trocar, so dragged upon the bowel as to cause obstruction. Some cases of obstruction post laparotomy are possibly due to leaving old bowel adhesions undisturbed at the time of operation. Cases have occurred in which death ultimately resulted from an obstruction undoubtedly present before operation.

An elongated adhesion between the uterus and interior abdominal wall, following ventrofixation, has caused fatal obstruction.

Some cases have been observed in which the obstruction was due to an internal hernia through an opening in the omentum.

Volvulus sometimes occurs after abdominal section, but probably only after some previous adhesion or constriction of the bowel.

There seems no question that by far the larger proportion of cases of post-operative intestinal obstruction are due to adhesions of the intestines to each other, to the abdominal walls, or to other

viscera. Sepsis, destruction or separation of the peritoneum, the use of strong chemical antiseptics in the abdominal cavity, rough handling of the visceral or parietal peritoneum by sponges, hands, or instruments, prolonged exposure of the peritoneum to the air, and the use of certain suture materials have all in turn been accused of producing adhesions. Experiments and clinical observation have, however, shown that neither of these conditions is sufficient to account for all cases. It is well known that intestinal or omental adhesions to the margins of the incision are found in nearly every case in which the abdomen is opened subsequent to laparotomy, and that they occur in cases in which all the above-mentioned conditions can be excluded. On the other hand, adhesions sometimes do not occur where they might reasonably be expected.

The symptoms of intestinal obstruction post laparotomiam are essentially the same as those of primary obstruction. They are, however, often masked by pain, vomiting, and tympanites,—so frequently present after abdominal operations without being significative of obstruction. Unless the obstruction is due to some untoward occurrence in the technique, the significant symptoms are not likely to be present for several days subsequent to the operation. If a patient does well for three or four days or longer after an abdominal section or vaginal extirpation, and is then suddenly attacked by pain followed by vomiting, tympanites, and inability to pass *fæces* and flatus, the diagnosis of intestinal obstruction is probable. If the vomiting becomes *fæcal*, the pulse rapid, the urine scanty, and symptoms of collapse set in, the diagnosis becomes reasonably certain. Unfortunately, however, all these symptoms are not uniformly present in obstruction. When the obstruction is high up in the small intestine *fæcal* vomiting is usually absent, and distention is likewise less marked. In these cases, also, the bowels may move several times after the pain begins, so that the diagnosis may be more or less uncertain.

Recent observations have furnished additional data upon which to base an opinion. Von Wahl first called attention to the occurrence of local distention of the bowel above the point of occlusion in

mechanical obstruction. This distention begins at the point of obstruction, and extends upward along the course of the bowel. In mechanical obstruction, therefore, if the case can be observed from the beginning, there will be found an elastic swelling localized at a point of the abdomen and gradually enlarging, the direction of increase in size being along the course of the constricted bowel above the constriction. The distention is attributed to rapid decomposition of the arrested intestinal contents. Coincident with this local meteorism is an increased peristaltic movement of the bowel, also above the obstruction. In the later stages, particularly if septic peritonitis with paresis of the intestinal walls has occurred, these distinguishing signs are no longer available. In cases of obstruction due to paralysis of the intestine from the beginning (probably always a consequence of septic peritonitis) these symptoms are not present. Here there is a uniform globular distention of the abdomen without movement of the intestines, and without noticeable contours of the bowels through the abdominal walls.

An additional diagnostic sign, according to Rosenbach, Rosin, and others, is furnished by the urinary reaction. It is claimed that in complete obstruction of the ileum there is always indican in the urine. In obstruction of the colon or high up in the small intestine this reaction is usually not present. The reaction is obtained by boiling a small quantity of the urine in a test-tube, and adding nitric acid *guttatim*. The urine turns to a Burgundy-red color, and a similarly colored precipitate is thrown down. This has been shown by Rosin to be a mixture of the urinary coloring matters known as indigo blue, indigo red, and indigo brown. If urine yielding this reaction is shaken, a violet-colored foam is produced. Rosenbach attributes great prognostic significance to this reaction. So long as it remains, the case is a grave one. If, after operation for relief of the obstruction, the reaction persists, the obstruction has not been removed. In cases where the obstruction is relieved the reaction disappears within twenty-four hours. While this sign must be regarded as a very important one, it is not absolutely pathognomonic, as a similar reaction occurs in some other morbid conditions.

The rational treatment of intestinal obstruction following abdominal section is to reopen the abdomen either in the line of the first incision or at some other point, seek for the place of obstruction, relieve the same by separating adhesions, dividing constricting or restraining bands, or untwisting a volvulus. If the gut be much distended an incision to let out the gas and fluid feces may be made, and the bowel afterwards carefully sutured. Gangrenous intestine must be resected, and the ends joined by suture or Murphy's button. At times it may be advisable to do colotomy, but the readiness with which the ends of resected intestine can be joined with Murphy's excellent device will probably render the operation of colotomy for this condition much less frequent than formerly. If the obstruction is due to a volvulus it would probably be always advisable to resect the twisted portion of the gut, as the volvulus is extremely likely to recur.

When practicable, it is probably always better to make the incision in the middle line, as it permits more thorough and ready exploration. When the abdomen is opened search should first be made for the obstruction in the iliac regions, as here obstruction is most likely to occur. If not found in either of the iliac fossæ, and if it cannot be located by local distention, the entire length of the intestine must be passed through the fingers until the constriction is found. As it not infrequently happens that there is more than one point of constriction, the examination should be thorough.

The distention and congestion of the intestine above, and its pale, empty, and flaccid condition below the constriction will often enable one to find the obstruction readily. Eventration of the intestines should be avoided, if possible, although, if the obstruction cannot be otherwise discovered, this becomes necessary.—*American Journal of Obstetrics*, October, 1894.

II. Experiments upon the Gall-Ducts and the Liver.

By Dr. NASSE (Berlin). Nasse has reported a series of experiments bearing upon extirpation of the gall-bladder. Like previous experimenters, he found no ill results from the operation upon guinea-pigs

and rabbits. Oddi observed that, after removal of the gall-bladder in dogs, great hunger, diarrhoea, and emaciation developed, and that after a month a widening of all the gall-ducts, and after two or three months a compensatory dilatation of the stump of the cystic duct occurred. Nasse was unable to confirm these observations, as none of these symptoms occurred in the dogs upon which he operated.

He further practised ligation of single branches of the hepatic duct, in order to be able to observe not only the primary but also the later stages of hepatic changes due to biliary obstruction. After the ligation, an hypertrophy at once began in those parts of the liver where the flow of bile was not obstructed, as Ponfick has observed after resection of portions of the liver. In the ligated portion of the liver the peculiar changes appeared, such as small areas of necrosis, proliferation of gall-ducts, and development of connective tissue. Then followed a rapid atrophy of the liver cells and shrinking of that lobe of the organ. This atrophy is completed in four months. The shrunken lobe is then represented by fibrous connective tissue, and the bile-ducts which developed at the beginning of the obstruction.

In a series of experiments by which the obstructed duct was again rendered patent, Nasse observed that the atrophy and the development of bile-ducts and connective tissue could be checked in their progress. Even when they had gone on to an extreme degree the liver cells regenerated as soon as the obstruction was removed from the bile current.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

III. A Liver Abscess and a Lung Abscess with Protozoa. By DR. F. GRIMM (Berlin). A peasant woman, forty years of age, entered the hospital at Yezo with an abscess of the lung and liver, the pus of which contained an immense number of flagellæ with flattened bodies (30–60 μ) and a long appendix at the rounded pole. The bodies were surrounded by a bright border, and in the insides were delicate tortuous canals.

The patient had been seized with chills, followed by high fever, on the second or third day a cough and expectoration developed. The phlegm was slightly fetid, pale yellow, and frothy, in the liver abscess, from which three litres of pus were evacuated, the protozoa were very thick,—three to ten could be seen in a field of a 100-power enlargement.

While the patient had not yet recovered, a pulmonary abscess, the size of an hen's egg, broke, after this, rapid convalescence began. Three months later the patient coughed up some bloody pus, which still contained traces of the flagellæ.—*Verhandlungen der deutsche Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. On the Operative Treatment of Gastric Ulcer.

By Dr. E. KÜSTER (Marburg). The author states that ulcers of the stomach have heretofore justified operation when perforation occurred, when stenosis of the pylorus resulted, and, lastly, when they gave rise to severe and frequent hæmorrhage. The last indication has induced operation in only one case,—a fatal case in the hands of Mikulicz. Küster has reported an especially instructive case which recovered. The patient, aged eighteen, had developed her symptoms after lifting a heavy weight. Vomiting and abdominal pain were followed by emaciation. Two years later a marked dilatation of the stomach and a floating kidney on the right side were made out. But a transitory improvement resulted from fixation of the kidney. One year after this, severe and repeated hæmorrhages from the stomach occurred, which reduced the patient to the extremest degree. Ten months after the onset of the hæmorrhages the patient was subjected to operation. After opening the greatly-dilated stomach, a large deep ulcer with overhanging edges was found situated upon the posterior wall near the pylorus. It was adherent to the pancreas. A cherry-stone was found lodged in its depth. Küster cauterized the ulcer with the thermo-cautery, and as the opening into the duodenum could not be found, a communication about five centimetres broad was made with the jejunum. Healing was complicated by an abscess in the abdominal wall, though the patient recovered and at the end of two years was able to

work and take any sort of food. No hæmorrhages occurred after the operation.

From this observation Küster has made the following deductions : (1) The hæmorrhage from a gastric ulcer can be checked by an energetic cauterization. (2) In ulcers which are located near the pylorus gastro-enterostomy is preferable to pyloroplasty, because the latter does not protect against subsequent contractions and narrowings. (3) A very wide communication between stomach and intestine not only does not present any objections, but because of the circular contraction of the suture line a large opening is really an advantage.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

V. Case of Perforating Ulcer of Stomach ; Recovery after Laparotomy and Suture. By Dr. MICHAUX (Paris). A robust man, thirty-one years of age, was admitted into the Hôpital Beaujon, September 23, 1894, with history of ulcer of stomach, and with symptoms of rapidly-extending peritonitis.

On opening the abdomen, Dr. Michaux discovered a small linear perforation high up on the anterior surface of the stomach, very near the cardia. At each respiratory movement a leakage of fluid from the stomach took place from this orifice.

The abdomen was washed out with boiled water, and large antiseptic sponges were placed for protection in the lower part of the abdomen. The surgeon endeavored to suture the borders of the perforation, but the silk threads tore through, on account of friability of the tissues. The high inaccessible situation of the ulcer rendered excision impossible. As a somewhat desperate experiment, Michaux made a fold of the front wall of the stomach by which the perforation was completely buried ; the ulcer was fixed in the bottom of this fold by a double row of Lembert silk sutures ; the first row extended beyond the ulcer which could be seen, and which had the dimensions of a five-franc piece. The wound was left open, an iodoform-gauze tent being inserted for drainage.

The patient was fed by the rectum for a long time; the gauze pledget was left in for eight days. A purulent fistula remained for six months; it then healed, and the patient was reported as perfectly well and able to work.—*Mercredi Medical*, October 24, 1894.

VI. Case of Perforative Ulcer of Stomach treated by Laparotomy, Stitching, and Washing Out. By R. H. BOURCHIER NICHOLSON, M.R.C.S. (Hull). A female, aged thirty-two, was admitted to the Hull Infirmary on October 27, 1894, at 6 P.M., suffering from acute pain in the epigastric region, and in a very collapsed condition.

A ruptured ulcer of the stomach was diagnosed. There was acute pain over the left hypochondriac region, loss of liver dulness, and some general distention of the abdomen. The first shock of the perforation having passed off, and the patient having rallied somewhat, three hours after the supposed rupture of the ulcer into the peritoneal cavity, the abdomen was opened by an incision, five inches long, above the umbilicus in the median line. On opening the peritoneal cavity there escaped a large quantity of flatus. The stomach being drawn into the wound the operator was guided by the escaping fluid contents to the anterior and upper surface very near the entrance of the œsophagus; in fact, so near that he could readily detect the perpendicular muscular fibres of the œsophagus entering the stomach walls. The opening was the size of a goose-quill. It had clean-cut edges, and was the centre of an area of thickened walls, about one and a half inches in diameter. Keeping his left forefinger over the opening to prevent further escape of the contents of the stomach,—which was apparently nearly empty,—after thorough cleansing, by pressing the ulcer and its surrounding hardness backward, and drawing some of the stomach up he was able to double the surface inward, so as to bring the two healthy peritoneal surfaces together by infolding. Then when these were fixed by eight Lembert's stitches, he again, with a continuous suture, brought the two surfaces together external to the first row of sutures.

The toilet of the peritoneum was performed by washing out with a douche, using boiled water at a temperature of 105° to 110° F.

For drainage purposes, an incision two inches long was made below the umbilicus, just over the pubes. More gas escaped; and, after again washing out from below most thoroughly, he inserted into Douglas's pouch a long glass drainage-tube, still washing with the boiled water until the fluid came away quite clear. The patient rallied directly the washing-out process—which acted as a stimulus—commenced. The patient was ordered to be fed by rectum with peptonized milk and brandy every four hours. An uninterrupted convalescence followed. The drains were removed on the fifth day.—*British Medical Journal*, November 3, 1894.

VII. Recovery after Intraperitoneal Perforation of Gastric Ulcer. By A. PEARCE GOULD, F.R.C.S. (London). In the course of a discussion of the subject of the operative treatment of perforative ulcer of the stomach and intestines, the author reported the following case from the service of Mr. Henry Morris, at the Middlesex Hospital: The patient was a young woman, aged twenty-four, who had suffered for six months from pain at the epigastrium after food. Two hours after a dinner of haddock, bread, and tea, and while running upstairs, a sudden pain caught her "round her heart," and before she could get to the hospital—a distance of a few hundred yards—the pain spread all over the chest and abdomen, and "drew her up double." When first seen, about an hour after the onset of the pain, there was no evidence of shock; her color was good; her pulse was 80, full and regular; and she answered questions readily. She complained of pain all over the abdomen, which was somewhat full, but moved freely with respiration. There was great tenderness above the umbilicus, none below; the percussion note was everywhere tympanitic, the liver dulness was lost, but no bell-sound could be elicited. She had not been sick. Three hours later, when Mr. Morris operated, her general aspect was worse, her

face was pale, and expressed pain ; she was tender below as well as above the umbilicus, and careful measurements showed that the belly had considerably increased in circumference. The pulse was 96, respirations 44, and temperature 98.2° F. Mr. Morris opened the belly above the umbilicus, and at once found a perforation in the anterior wall of the stomach close to the pylorus ; the stomach was drawn out, the ulcer sutured, and the peritoneum was very thoroughly washed out with carbolic acid solution, 1 in 400, at a temperature of 105° F., and a good deal of lymph was sponged from the surface of the liver. During the washing out the patient stopped breathing once or twice, and the pupils dilated widely, while the pulse became weak, dicrotic, and intermittent. The patient made an excellent and complete recovery.

This case Mr. Gould states to be the fifth instance in which a perforated gastric ulcer has been deliberately cut down upon and sutured, and the peritoneum cleaned and recovery ensued.

These cases have been recorded by Kriege, Morse, Maclaren, and Gilford. In Maclaren's case : A girl, aged fourteen, was sent into the Cumberland Infirmary, February 4, 1894. The girl was small for her age. She had the usual story of pain following food for some time, and then a sudden, severe attack with marked collapse. The operation was done nine hours after perforation, which had occurred two hours after dinner. The intestines were not distended. She bore operation well, and the peritoneal flushing was very thorough. No food was given by the mouth for a week, then beef-tea alone for two days, next arrow-root, and so on. Nutritive enemata were well retained, and the patient suffered little inconvenience and no visible detriment from thus putting her stomach at rest. Her recovery was absolute.

In Kriege's case the serous membrane was wiped clean, not flushed. Mr. Taylor reports yet another case in which the peritoneal cavity was washed out and drained below the umbilicus ; subsequently a subphrenic abscess was opened, and the patient died from intestinal obstruction from kinking of the bowel.—*British Medical Journal*, October 20, 1894.

VIII. Gunshot Wound of the Spleen and Kidney; Abdominal Section; Hæmostasis by Deep Suture; Recovery. By LOUIS McLANE TIFFANY, M.D. (Baltimore). The patient was a male negro, twenty years of age. Two hours previous to entering the University Hospital, March 21, 1894, he had been shot with a small calibre rifle from a distance of twenty feet, the weapon being directly behind him and he being erect. His urine was slightly albuminous; the pulse, temperature, and respiration normal. There was a bullet-wound three inches to the left of the spine just below the last rib, from which blood oozed. Three hours later, about five hours after the shooting, the only change that had taken place since entry into the hospital was an increase of five per minute in the number of respirations; the pulse and temperature were not changed, and there was no appearance of shock and no pain. External examination of the abdomen by touch and palpation revealed nothing, not even painfulness.

The patient was anæsthetized, laid on the belly, and the wound, after being enlarged, was examined. The upper portion of the left kidney was perforated, and dark blood flowed from the peritoneal cavity beyond. This large wound was filled with gauze, the patient turned on the back, and the abdomen freely opened along the left semilunar line. A moderate amount of blood was free in the peritoneal cavity. No wound of the intestine could be discovered, but the spleen was found perforated, blood flowing freely from the wound of entrance as well as from the wound of exit. The latter wound, in the concavity of the organ, was slightly the larger of the two.

The perforation through the spleen was about three inches from the free lower border. The bleeding was arrested in the following manner: A long needle threaded with silk was passed entirely through the spleen central to and parallel with the bullet-track; the long ligature was then tied over the free border of the organ so as to press the surfaces of the wound together tightly enough to arrest bleeding, yet not to tear through the splenic tissue; the ends of the ligature

were cut short, the peritoneal cavity cleansed by copious irrigation with hot water, and the abdominal wound closed. The kidney was tamponed with gauze through the dorsal wound. Convalescence was uneventful; the anterior wound healed by primary union; urine flowed from the dorsal wound for two days only, union by granulation taking place. The patient left the hospital well April 2.—*Medical News*, November 17, 1894.

IX. A Successful Splenectomy for Chronic Inflammatory Hyperplasia. By Dr. JAMES MURPHY (Sunderland). A woman, forty-five years of age, for more than a year had noticed a painful swelling in the left hypochondriac region. There had been no affection of the alimentary system, and no alteration in the quality or quantity of the urine. She had been losing weight in spite of a good appetite for several months, and during the same period she had suffered much from shortness of breath, and had become very blue about the face and neck.

On admission there was a large tumor on the left side of the abdomen passing under the ribs above, and below reaching to the level of the iliac crest. Externally it reached far back to the spine, and internally it extended beyond the median line; it was very slightly movable; its surface irregular, as if four or five small masses grew from it. No serious disease could be detected in the chest; the heart-sounds were normal; the blood was found to be in a fairly healthy condition, and there was no evidence of leucocythæmia. Her breathing was short and rapid, and she was distinctly cyanosed, and she occasionally had slight rigors; she was in a very enfeebled condition, losing flesh and strength, and suffering much from pain in the spleen. There was no leucocythæmia, and her symptoms were evidently due to the enlargement of the spleen.

On April 25 an incision about eight inches long was made along the left linea semilunaris down to the peritoneum, the hæmorrhage was excessive,—dark venous blood,—and some seven or eight large dilated veins were tied with catgut. The peritoneum was then

opened. There were no adhesions to the parietes, but the omentum was firmly adherent over the greater portion of the spleen, in some places being puckered up, which gave rise to the irregular feeling discovered through the abdominal wall. The transverse colon was also adherent in two or three places; the adhesions were rapidly but carefully broken down, the bleeding points being instantly seized with Péan's forceps, but quickly as this was done, two or three ounces of very dark venous blood were lost. The vessels, principally veins, were exceedingly friable, and readily tore. All bleeding points from the adhesions being secured, the spleen was gently removed—the lower end first—from the abdominal cavity. She suddenly became very much collapsed, and seemed as if she were about to die. The pedicle, which was thin and broad, measuring about five inches, was secured in the following manner: beginning at the upper edge, where the vessels were smallest, it was secured in three portions with double silk ligatures, and divided between them. The ligatures were not locked; in this manner the outlying (so to speak) portion of the pedicle was secured, but the large vessels in the centre of the pedicle were left untouched. In a similar manner the lower outlying portion of the pedicle was secured in four portions, the ligatures were not locked, and the pedicle was cut across between each pair of ligatures after they were secured. There then remained in the centre a portion of the pedicle about the size of a thumb, containing vessels somewhat bigger than a large goose-quill; a long silk ligature was carefully drawn through these, and the remaining portion of the pedicle was firmly secured with a Staffordshire knot. The spleen was then cut off; there was no more bleeding. Little blood escaped into the peritoneum, having been caught in sponges. She was in such a collapsed condition that no time was lost in irrigating the abdomen, which was rapidly closed by silkworm-gut sutures; no drainage.

The patient rallied slowly, and gradually improved, but her convalescence was complicated by a moderate broncho-pneumonia. At the end of six weeks she was discharged, quite free from pain, and

in much better health and spirits than she had been for two years. Microscopical examination showed the spleen to be the seat of a simple inflammatory hyperplasia.—*British Medical Journal*, November 3, 1894.

X. Drainage after Operations on the Gall-Passages.

By RUTHERFORD MORISON, F.R.C.S. (Newcastle-on-Tyne). A pouch exists below the right lobe of the liver and gall-bladder, separated from the general peritoneal cavity by natural barriers. This pouch can be efficiently drained through an opening in the parietes near the lower end of the kidney. A transverse is better than a vertical incision in operating for gall-stones; less likely to be followed by ventral hernia, and giving free access. Biliary fistula results from operations for gall-stones in a considerable percentage of cases in which the gall-bladder has been attached by sutures to the parietes. The method of attachment has little to do with this result, and it may follow when the ducts are patent. The gall-bladder and ducts may safely be allowed to empty into the pouch described if it is properly drained. The gall-bladder should never, except when suppurating, be stitched to the abdominal wall. If the pouch is properly drained, (a) when the gall-bladder is distended, the opening in it should be closed by sutures and the viscus returned into the abdominal cavity and the drain left until the certainty of its successful closing is complete. (b) When the gall-bladder is shrunken and there is difficulty in closing the opening made in it, it may be returned unclosed. (c) When a stone is impacted in the cystic duct and evades all ordinary efforts to remove it, the gall-bladder should be excised and the duct ligatured after removing the stone in it. (d) When a stone is impacted in the common duct, the duct is incised, and after the stone or stones are removed the opening may be left unclosed if there is any difficulty in applying a satisfactory suture.

Experience suggests that the chief problem in operations for gall-stone is the purely mechanical one of effectual drainage. If this be admitted, consideration of the anatomy of the parts points to a

solution of the difficulty. The gall-bladder can be opened on its under surface and allowed to drain into this pouch, and an opening may be made into the common bile-duct on its outer or under surface for the extraction of a stone, and left to take care of itself in confident anticipation of a successful result if effectual drainage be secured by the aid of gauze packing and a tube.

Conclusive clinical evidence of this position will take some time to accumulate. The author offers the results of nine cases as bearing directly upon it. In all nine cases the common duct was freely opened; in two the gall-bladder also, to remove a large impacted stone. In three of them an attempt was made to close the opening in the duct by sutures, without success, however, as in all three a free escape of bile occurred through the drainage-tube. Of the nine cases, two died; one death was due to hæmorrhage, chiefly from the abdominal parietes, a few hours after the operation; in the second case no satisfactory explanation could be given or found post-mortem of nervous symptoms of a peculiar sort ending in death on the third day. In neither was there peritonitis or any bile in the peritoneal cavity. The remaining seven cases made excellent and complete recoveries.—*British Medical Journal*, November 3, 1894.

XI. Extensive Intestinal Resection for Tuberculosis.

By Dr. W. KÖRTE (Berlin). Körte presented a patient with the following brief history:

(1) Man, twenty-five years old, was operated upon November 16, 1891, for acute purulent peritonitis.

(2) March 16, 1892. Extirpation of the processus vermiformis. August, 1892. Tumefaction was observed along cæcum and ascending colon.

(3) August 27, 1892. Extirpation of the cæcum and colon nearly as far as the flexura hepatica. Sound tissue in the gut was not reached. Anus præternaturalis formed. Examination of the specimen showed it to be tuberculosis. The enterotome was applied without result.

(4) November 19, 1892. Twenty-one centimetres more of diseased colon was resected. The end of the colon was turned in and the small intestine anastomosed laterally. A fistula formed.

(5) February 27, 1893. Plastic operation after the method of Dieffenbach was not successful.

(6) May 13, 1893. Implantation of a loop of small intestine into the flexura coli iliaca. Narrowing of the colon by sutures of the skin. For fourteen days fæces passed per rectum, and then the fistula became re-established.

(7) July 3, 1893. Colon separated from the implantation, and both intestinal openings closed by invagination. Regular evacuations by rectum followed.

The remaining portion of colon continued to secrete intestinal juices, and so the final operation was done.

(8) July 28, 1893. Extirpation of the entire segment of colon which was shut off from the fæcal current.

Recovery followed. Subsequent treatment with iodoform gauze tamponnade. The fæces from the fistula remained always thin in character, but as soon as it travelled through the short tract of colon and the rectum it became firm and natural.

In intestinal anastomosis the gut must be cut across and the portion from which the current is diverted must be sewed up or else the intestinal contents may find their way therein.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

XII. A Rare Form of Strangulation of the Small Intestine in Inguinal Hernia. By Dr. C. LAUENSTEIN (Hamburg). Lauenstein has reported a case of strangulated, external, right inguinal hernia in a twenty-four-year-old man, in which two coils of intestine which were the seat of hæmorrhagic infarcta were found. After liberating the strangulation by dividing the internal ring, another coil of intestine in which a similar condition was found was drawn out through the opening. This proved to be the portion of gut between the two strangulated coils.

The whole length of these three segments was about one metre, and was about fifty centimetres above the valve. The mesentery of this portion of intestine showed cicatricial thickenings. The gut was replaced and the operation proceeded with after the method of Bassini. After a period of meteorism, vomiting, and diarrhoea the patient recovered.

Lauenstein advises always that when two knuckles of intestine are found herniated, the intermediate segment be examined.

A similar case could not be found in the literature. The reported cases of artificial anus with four openings are probably similar cases. —*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

XIII. Resection of the Rectum for Prolapsus. By Dr. BOGDANIK (Biala). Bogdanik recommends for the treatment of severe prolapsus recti the resection which was first performed by Auffret (*Progrès méd.*, 1882, No. 34). A year later Mikulicz reported the operation with a thorough description of the technique (*Gazeta Ckarska*, 1883, Nos. 47 u. 48). Billroth, Nicoladoni, Bogdanik, Nelaton, Perier, Krönlein, and Hoffa have made reports of successful operations.

The technique of the operation presents no especial difficulty when the suture described by Bogdanik is used. The intestine should be emptied thoroughly by laxatives and enemata, and just before the operation tincture of opium should be given. The patient is placed in the lithotomy position, and the apex of the tumor grasped by forceps in the hands of an assistant. The left index finger of the operator is introduced into the thoroughly cleansed bowel, and an incision carried about the prolapsed bowel about one or two centimetres from the anal border. If the surgeon is convinced that there are no contents between the outer tube which has been cut about and the inner, the two tubes are united by interrupted sutures which are applied between the wound and the anal orifice or border. An assistant holds one end of the threads, while the outer and inner

intestinal tubes are united by means of the other until the whole ring is surrounded. Before each needle puncture is made the wound in the outer tube is widened, so that after the suture has been completed the outer tube is separated circularly. A ligation of the vessels, as Mikulicz recommends in his method, is superfluous, and the loss of blood is very small. The inner tube is now cut off at the level of the incised wound, and the mucous membrane of the outer and inner intestinal tubes united by a continuous suture. Bogdanik recommends the use of catgut, though the choice of suture material is indifferent. After the completion of the suture the forceps are loosened, and the stump of rectum slips back into place. An iodoform and opium suppository is introduced, and the buttocks fixed by a firm adhesive strap.

Bogdanik has operated upon four cases by this method, all of which were able to be up and about in a few days. They varied in age from one to three years. A fifth child, five years of age, in which the prolapsus was complicated by an hydrocele, died of septic peritonitis after three days. The first case upon which he operated died of variola during convalescence. The autopsy showed that good union had taken place at the wound.

Nelaton had recurrence of the prolapsus in the two cases upon which he operated. In Bogdanik's cases the cicatricial contraction about the anus prevented further prolapsus. A patient, one year of age, in which he resected eight centimetres of rectum, was returned to the hospital thirteen months later with symptoms of incarceration. Examination showed that the rectum was so contracted that its lumen would not admit a fine probe; and an anus præternaturalis was made. The peritoneal cavity contained some serous fluid and was quite congested; when the intestine was opened, beside a large amount of faecal matter; there escaped a great deal of indigestible material, such as potato-peelings, egg-shells, pieces of cork, cherry-stones, etc. The patient improved greatly after the operation, and the peritoneal symptoms disappeared. The rectal stricture was then stretched by bougies; but as a satisfactory result was not obtained by this means,

radiating incisions were made in every direction. The rectum was then stretched by the fingers, and above the seat of the stricture were found plum-pits, cherry-stones, etc. The freshened edges of the colostomy wound were then sutured. The bowels emptied per rectum, though a slight abdominal fistula persisted. With the view of closing this fistula the patient was again chloroformed. Anæsthetization was established in three minutes, when asphyxia developed, and the patient died after five hours.

In the future, Bogdanik intends to perform colopexy, instead of the resection. He suggests opening the abdomen on the left side as in colostomy, and, after drawing up the prolapsed bowel, suturing it to the parietal peritoneum. This operation is neither more difficult nor more dangerous than the resection of the lower end of the rectum. It cannot, of course, be done in every case, as, for example, when the serosæ of the prolapsed rectum are adherent. *Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

JAMES P. WARBASSE (Brooklyn).

EXTREMITIES.

I. Results in Three Hundred and Forty Major Amputations. By Dr. W. L. ESTES (South Bethlehem, Pa.). Of the total number only nineteen were done for diseased conditions; 321 were done for injuries to limbs, usually the result of great violence, as they were all cases from railroads, mines, or factories.

The time of amputation in his practice has been determined by the condition of the patient when seen by him. He pronounced it improper to amputate a limb when the patient is almost moribund from loss of blood, or nearly exhausted from a long, rough journey, or not yet recovered from psychical or primary shock. A major amputation undertaken at once is usually followed by death. He is convinced that the condition ordinarily observed by the surgeon a few hours after a major injury, and usually called shock, is really a condition of acute anæmia. To operate while in this condition is usually fatal. If, however, the hæmorrhage be thoroughly controlled by an Esmarch tourniquet, applied over the crushed tissues if prac-

licable; and if not, at a point just above them, and the comminuted tissues and the uninjured parts of the limb be thoroughly cleaned and disinfected, and an antiseptic dressing applied over all, the amputation may be deferred for twenty-four or thirty-six hours, or even longer, while by careful feeding and stimulation the patient may recover some strength and the blood-vessels have time to fill with fluid. If the patient is in good condition, nothing is to be gained by waiting.

For the whole number of single major amputations, 294, including seven hip-joint amputations, the general mortality rate is 4.76 per cent. During the last six years, the cases being exactly of the same character as before, but having had greater care to prevent hæmorrhage on their way to the hospital, and in cases of much loss of blood, with delay until the condition of acute anæmia was somewhat relieved, there were 180 single major amputations with only five deaths, or 2.77 per cent. mortality. Included in these cases are six hip-joint amputations.

In twenty-six cases of multiple operations and extremely complicated injuries, there were three deaths, 11.5 per cent. mortality.

The detailed figures as to the 294 single major amputations are as follows:

	No.	Deaths.	Mortality. Per Cent.
Forearm	37	0	0.
Arm	27	1	3.7
Shoulder-joint	13	1	7.99
Foot	19	0	0.
Leg	97	2	2.06
Knee-joint	17	1	5.88
Thigh, lower third	44	5	11.36
Thigh, middle third	25	2	8.
Thigh, upper third	8	1	12.50
Hip-joint	7	1	14.28

These surpassingly good results the author believes to be due to aseptic practice and to the saving of blood before and during operation.—*Medical Record*, November 3, 1894.

REVIEWS OF BOOKS.

ASEPTIC SURGICAL TECHNIQUE, with Especial Reference to Gynæcological Operations, together with Notes on the Technique employed in certain Supplementary Procedures. By HUNTER ROBB, M.D. Illustrated with twenty-five plates and forty-seven figures. Crown 8vo. 264 pages. Philadelphia: J. B. Lippincott Co., 1894.

PETIT MANUEL D'ANTISEPSIE ET D'ASEPSIE CHIRURGICALES. Par FELIX TERRIER ET M. PERAIRE. Seventy illustrations. 12mo. 186 pages. Paris: Félix Alcan, 1893.

ANLEITUNG ZUR ASEPTISCHEN WUND BEHANDLUNG. Von Dr. C. SCHIMMELBUSCH. Second Edition. 12mo. 210 pages; thirty-six illustrations. Berlin: August Hirschwald, 1893.

Few, if any, of the many works devoted to surgery give as full and detailed a description of modern aseptic surgical technique as the importance of the subject demands, and these small volumes, which aim to supply this need, will doubtless prove of great value to those of the profession who have occasion to do surgical operations. That this lack of specific directions in the more elaborate treatises on surgery is not confined to our own literature is proved by the fact that two other works, very similar in their scope to Dr. Robb's, have appeared within the past year, the one in French, the other in German. All of the writers are men of experience as practical operators and as laboratory investigators. A comparison of the three books is not without interest.

In both of the foreign volumes the opening chapters are devoted to a brief account of the origin of antiseptis, and of the original methods and dressings of Sir Joseph Lister; neither devotes much

attention to the consideration of the germs themselves, which are now known to be the chief factors in the production of diseases dependent upon wound infection. Robb neglects the historical side of the subject, but begins his book by emphasizing the necessity to the surgeon of a bacteriological training. He describes all of the micro-organisms involved in the various septic processes; gives their biological characteristics, and the clinical phenomenon which each produce; finally, a colored plate represents their chief forms.

Now that the various theories as to technique are controlled by bacteriological experiments, the ground upon which modern surgery is built is becoming more and more firm. Even in the few months that have elapsed since the French and German books appeared there have been many advances. Terrier gives to antiseptics a prominent position; Schimmelbusch, whose book appeared a few months later, favors asepsis, though antiseptics is still considered to be very important; Robb, armed with the results of still more recent investigations, is iconoclastic in his treatment of the various antiseptic idols,—many he destroys utterly, others are battered and bruised, even corrosive sublimate totters upon its pedestal. Asepsis is for the present the dominant power.

The three authors differ somewhat in the stress laid upon the means used to secure the best surgical results, although the difference is one of degree and not of kind. Each book has points of superiority over the others. Terrier gives the best description of filters, and of dry and moist heat sterilizers. The application of antiseptics and of asepsis to various regions of the body, such as the pharynx, the stomach, and the intestines, is also given by the French authority alone. Chapters devoted to the bibliography of the subject, and to the application of asepsis in first aid to the injured are peculiar to the book of Schimmelbusch. All give definite instructions concerning the operating room, its equipment, the corps of assistants, and their duties, and the technique of actual operations; all are valuable books to use as guides. When, however, the three books are compared, the difference is at once apparent. The French and German books will

aid one in securing a comprehensive knowledge of the subject, but to the general practitioner in any country who wishes to have the theory stated concisely and the actual working details of practice fully described, Robb's book is by far the most valuable.

Considered more in detail, the characteristic features of the book by the American author are as follows: The principles of sterilization and their practical application to dressings, suture material, ligatures, instruments, and to the human skin are given in full. The many seemingly unimportant items which are given are really as valuable as anything in the book. Ligatures are still bitten off and the needles, after they are threaded, are held between the lips till used, blankets are adjusted, and the pocket handkerchief used during the progress of an important operation and by surgeons who pride themselves upon their technical accuracy, and who report the operation in the journals with the statement that "strict asepsis was observed." Similar flaws in technique are of daily occurrence in nearly every operating room, and the fact cannot be dwelt upon too often.

It is greatly to be regretted that, almost without exception, the preparations described and the operations performed relate to the pelvic disorders of women. For an operator who limits his sphere of activity to this class of cases, this is perhaps an advantage, but to a surgeon and not a mere gynæcologist the occasional mention of some other part of the body would give the work an added value.

Post-operative cares, including the management of diet, vomiting, rectal feeding, shock, the removal of stitches, dressings, and similar topics are fully described.

• "Operations in the country, in private houses, or in other places where the technique must necessarily be more or less imperfect," is the title of a chapter full of good suggestions as to the armamentarium, improvised operating rooms, and modifications in technique required by circumstances.

With this the consideration of the technique of aseptic surgery ends. The four additional chapters are connected with the bulk of the work by a very slender pedicle, it is true, but give an added

weight to the subject. One is devoted to anæsthesia as an aid to diagnosis in obscure conditions of the pelvic organs.

Notes upon bacteriological and clinical examinations in surgery and gynæcology form another chapter. "Although for an intelligent knowledge, the text-books devoted especially to this science must be consulted, it has, nevertheless, been thought worth while to devote a few paragraphs here to the subject of the outfit which will be required for the ordinary work of the investigating surgeon, and at the same time to refer briefly to some practical points which may be of service."

The examination of the interior of the female bladder and the catheterization of the ureters are carefully described. Thanks to Dr. Kelly, these procedures are now so simplified that the directions here given should enable any one to use this important aid to diagnosis.

The closing chapter is devoted to the subject of pathological examinations, and is an able plea for the more extended use of the microscope and the microtome as aids to surgical progress. The study of gross specimens obtained from operations and from the autopsy table is also strongly recommended.

The publishers deserve a share in the hearty commendation which Dr. Robb's book merits, for the printing, plates, and paper are all excellent.

H. P. DE FOREST.

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ON MOVABLE KIDNEY.¹

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IN the consideration of the subject of movable kidney I wish to emphasize three propositions,—

- (1) Movable kidney is extremely common.
- (2) It is capable of producing very distressing symptoms, and in some instances is a menace to life.
- (3) It is curable by a simple and safe operation.

My own experience with movable kidney from a surgical stand-point extends back a little more than three years. Prior to the first nephrorrhaphy, which I performed in May, 1891, those cases I met with were given little or no thought. Since the date mentioned I have looked with more interest on my cases, and have come to marvel at the frequency of the malady. I have examined a limited number of persons likely to be the subjects of movable kidney since my first operation for its relief, and in a comparatively small number of subjects have encountered twenty-seven cases. Edebohls, who has studied 500 cases, fixes the rate at one for every five or six women examined. Linder gives about the same rate. Osler makes no statistics, but mentions it as a common occurrence in his hospital wards. The records of these observers and my own cases justify the assertion that it is a common malady.

Causes.—It is not surprising that we should so frequently find movable kidney when we reflect upon the causes which produce it.

It occurs more often in women. I have never seen one in a male subject. *Age* is a factor in its production. My own cases

¹ Read before the Southern Surgical and Gynæcological Association, at Charleston, S. C., November 14, 1894.

have been in subjects varying in age from twenty to thirty-five years. In only one instance have I seen it in a woman over forty. *Both* kidneys may be movable at the same time. The right is the one that is affected in the preponderating majority of the observed cases. This is accounted for by the *relation of the kidney to the liver* on this side. In women who wear corsets from early girlhood the lower segment of the chest is constricted in such a manner as to interfere with its expansion during the act of respiration. In the normal respiratory act, unhampered by constricting corsets and bands, the contraction of the diaphragm tends to push the liver downward, while at the same time it is pitched slightly forward. In the chest limited in its expansion, this normal movement or rhythm of the liver is intercepted, and, instead of pitching forward, the direction is reversed, being downward and backward. This causes the thick posterior border of the liver to impinge upon the upper end of the kidney. The constant pounding of the heavy liver, repeated 25,000 times every twenty-four hours, will in many instances dislodge the kidney from its bed. Even when only slightly loosened the concussion it sustains in walking, lifting, straining at stool, together with the continual hammering of the liver, will soon increase the displacement and cause a freely movable kidney.

The ease with which these causes produce movable kidney is much increased when from any cause there is a rapid absorption of the perirenal fat, such as occurs in wasting diseases. The absorption of the perirenal fat will of itself produce movable kidney.

Two anatomical facts help to explain the preponderance of right over left kidney displacement: (1) *the greater length of the right renal artery*, and (2) *the firmer attachments* of the left kidney. The reflections of the peritoneum from the spleen and the colon to the left kidney help to hold that organ in position.

I have twice seen a movable kidney follow obstruction of the ureter. It happened that both of these cases were on the left side. The increased weight of the kidney, due to accumulated urine and congestion, must have played an important part in the etiology of the dislocation in these two cases.

Symptoms.—In many cases of movable kidney there are no symptoms. In others the symptoms are extremely distressing, producing great mental disquietude, as well as intense physical suffering. All neighboring organs may participate in these disturbances and cause a simulation of other disorders, chiefly such as come within the domain of the gynæcologist.

The amount of pain and annoyance occasioned by movable kidney do not bear a direct relation to the degrees of displacement. I have observed a number of cases of freely movable kidney in which the symptoms were trivial, while in others where the displacement was slight they were distressing. It seems that the symptoms increase in severity until the dislocation amounts to eight or ten centimetres, and when the displacement exceeds this distance many of the pronounced symptoms may abate.

The symptoms first observed are disturbance of the digestive apparatus or nervous system. Chronic gastro-intestinal catarrh is very commonly associated with it. Constipation, flatulence, indifferent appetite, eructations, colicky pains, and general abdominal discomfort accompany many cases. In not a few icterus is visible. The nervous symptoms arise from tension on the renal plexus of nerves, and this brings about epigastric pain, annoying and dragging sensations, palpitation, and a feeling of apprehension. All these symptoms are somewhat aggravated when the patient attempts to lie on the opposite side to that of the movable kidney. Uncommon exercise, mental anxiety, or fatigue intensifies all these symptoms, and will likely produce nausea and vomiting, tenderness of the abdomen, and pain quite like that of renal colic, all of which may persist for many hours after the exciting cause is removed. Menstruation invariably augments the disagreeable symptoms.

In a proportion of cases the symptoms are grave. Torsion of the ureter is common. Partial occlusion by bending is not uncommon, inducing a distention of the pelvis by dammed-up urine. Hydronephrosis may follow. Calculus is thus invited by reason of poor drainage.

When a patient presenting any of the above-mentioned symptoms, particularly a female, presents herself, a physical

examination of the abdomen should be insisted upon. Indeed, so common is this affection that no examination of a woman suffering with continued abdominal and pelvic symptoms should be considered complete without palpation of the kidneys.

Diagnosis.—While the symptoms already given may strongly point to a dislocated kidney, the diagnosis must depend upon finding the displaced organ by bimanual palpation. In the common run of patients it is a very easy matter to grasp the dislocated kidney between the opposing hands, one placed over the lumbar region and the other over the abdomen, just beneath the free border of the ribs. The size, shape, density, and degree of movability will be readily perceived. A freely movable kidney, when thus palpated, will sometimes escape from between the fingers so readily as to produce the same sensation that one experiences when he shoots a wet seed from between his thumb and finger, and it may be so far removed from the position in which it was first found as to require a diligent search for its recovery. There are several acts and postures which may aid in engaging the kidney when attempted by bimanual manipulation: coughing or a deep inspiration will dislodge it when displaced upward and sheltered by the ribs. Leaning forward when in the sitting posture will also bring it within reach. The knee-elbow posture will sometimes enable you to discover it.

Apart from tumors of the kidney itself, the condition most likely to be mistaken for movable kidney is distended gall-bladder. Only a few days ago I did a successful cholecystenterostomy for distended gall-bladder, in which case there was also a movable kidney. Thus we may have both conditions present in the same subject. In differentiating a distended gall-bladder, the history, the usually anterior position of the tumor, the difference in the planes of attachments, the constant situation of the gall-bladder, and the variable situation of the kidney are sufficient to render the diagnosis comparatively easy.

New growths in the abdomen may be confounded with movable kidney. Here the character of the suffering, the cachexia, and often intestinal obstruction, together with the shape and density of these growths, are in sharp contrast to the history,

symptoms, and mobility of the kidney. Repeated examinations, and, if necessary, anæsthesia, will enable one to establish the diagnosis in doubtful cases.

Operation.—Nephrorrhaphy is not indicated in every case of dislocated kidney, but only in such cases as manifest distressing or dangerous symptoms. When gastro-intestinal disturbances impair the general health, when nervous symptoms are severe, when the dragging abdominal pains are constant, when disease of the other organs is simulated, when hydronephrosis is threatened, when one or more attacks of torsion have occurred, the operation is imperative. The method I have settled upon after a trial of several is as follows: The subject is prepared as for abdominal section, purged with salts the day before, solid food withheld for two days preceding the operation, and the body cleansed with warm baths. On the evening before the affected side and back are shaved and scrubbed with green soap and water and a wet pad of bichloride applied. This remains on until the patient is put upon the operating table. This dressing is then removed and a final washing is practised. The patient is placed in a semi-prone position with a firm pillow or pad (preferably Edebohls'), so as to render prominent the affected side, thus increasing the ilio-costal space. The incision is then made, commencing a half-inch below the twelfth rib and towards the outer edge of the erector spinæ muscle. This is carried in a slightly oblique downward and outward direction to near the crest of the ilium. The bleeding, which is usually trifling, should be checked as it occurs by fine ligatures, so as to keep the wound clear of blood and unhampered by the presence of the forceps. When the cut has reached the edge of the quadratus lumborum, the aponeurotic extension of the transversalis is severed when the finger reaches into the renal space. The hand of an assistant presses the kidney from the front into its proper bed. The fatty capsule is torn through and the kidney exposed through its entire length. The kidney is carefully examined both by inspection and palpation. I have often with perfect impunity delivered the kidney through the abdominal wound, which enables me to palpate the pelvis and upper end of the ureter. The aseptic finger is made

to sweep about the kidney gently for the purpose of slightly irritating and disturbing its fatty bed. This I deem important as conducing to a certain amount of exudation, which renders the subsequent adhesions stronger. The kidney is next placed as nearly as possible in its normal position and a medium-sized suture in a curved needle (not a Hagedorn or one with severe cutting edges) passed first through the deeper portion of the cut walls, then well into the substance of the kidney, and finally through the other side of the wound. The ends of this suture are intrusted to an assistant, who makes enough traction to keep the kidney in the position desired. The fibrous capsule is now split on the convex exposed border and the margins slightly turned back, making a long, narrow band of exposed kidney substance. With fine silk and a small curved needle the reflected edges of the capsule are stitched to the deeper portion of the wound by interrupted sutures, usually four on a side. When these are snugly tied, the larger suture, which should be placed nearer the upper than the lower end of the kidney, is tied. Great care must here be practised in order that there shall be no considerable pressure from this suture, the aim of which is to give support and more securely fix the position of the kidney during the healing process. All the sutures should now be closely cut. The upper portion and middle of the lumbar wound, particularly that part traversed by the suture passing through the substance of the kidney, is closed by three or four deeply-placed interrupted sutures. The lower half of the wound should be packed with strips of iodoform gauze, the packing to be fitted snugly to the exposed part of the kidney and to fill well the open wound. An ample dressing of iodoform or sterilized gauze is placed over this, a firm compress over the kidney to support it, and these held securely in position by a binder.

I have gone into great detail concerning the technique of the operation, because I believe that success requires an observance of such details. I wish particularly to insist upon the treatment of a part of the wound by the open method. This, in my opinion, adds much to the safety of the operation, as well as greatly enhances the result. The only case (my last) where I did not

follow this plan of treatment gave me trouble by suppurating, and thus necessitated the reopening of the wound a week after the operation, and finally required packing.

The after-treatment is simple enough, the essential point being confinement in the bed on the back for four weeks, at the end of which time the adhesions are sufficiently firm to maintain the kidney in position.

In spite of my predilections for ether I am in the habit of using chloroform in this operation for reasons which are obvious.

CASE I.—Mrs. J. F. J., aged thirty-four; twelve years married; no children. An invalid many years. Fell from a horse when a girl. Later found a tumor in the right side. Consulted a surgeon, who pronounced it an ovarian tumor. Gave iodide of potassium three years. This produced no change in the size of the tumor. Consulted me in March, 1891. Bimanual examination revealed a movable kidney of the right side. Symptoms distressing.

Operation May, 1891. Incision V-shaped. Treatment of kidney that indicated in the account of technique. She made a prompt and excellent recovery. I examined this case two years later and found the kidney securely fixed.

CASE II.—Mrs. A. E. J., aged thirty; married; four children. She discovered four years ago a movable tumor in her right side. She consulted the same surgeon, who, as in Case I, diagnosed a tumor and prescribed iodide of potassium, and promised to operate when the tumor grew larger. The tumor did not grow larger. I saw her first in April, 1891. Bimanual manipulation revealed a freely movable kidney, capable of descending into the right iliac fossa. The principal symptoms in this case were intense nervousness, apprehension, and depression, almost amounting to melancholia. She repeatedly told me she thought she was "crazy," and was wholly unfit for the performance of her domestic duties.

Operation was done in March, 1891, by the V-shaped incision. When the kidney was brought into the wound a cyst as large as a hen's egg was found on its convex border. This was amputated and the raw surface sewed in the wound in the usual position. The recovery in this case was uninterrupted. The mental depression soon disappeared. She grew healthy and cheerful, and her general health rapidly improved. This patient became pregnant, and was delivered

of a fine child on April 23, 1894. I attended her, and immediately after her delivery made an examination of the previously movable kidney, and found it firmly fixed.

CASE III.—Mrs. W., aged thirty-four; married; no children. Began to suffer from dyspepsia and nervousness after an attack of typhoid fever. She did not recuperate promptly, and remained lean. She had dragging, gnawing pains in the abdomen. She discovered a lump in her side, and consulted me concerning it in June, 1891. Diagnosis, movable kidney. Operation was done July, 1891. A single incision was made as described above, and the kidney anchored in the usual way. The recovery was prompt, her general health rapidly improved, and all the symptoms disappeared. This case remains cured.

CASE IV.—Mrs. R., aged twenty-two. Frail and delicate from girlhood. At the age of fourteen she was skipping a rope when she felt something give way in her side. She was never strong afterwards. She became nervous and hysterical, and when her menses appeared a year later she suffered intensely. I saw her in October, 1891, and diagnosed movable kidney. Operated November, 1891. Recovery satisfactory. In six months her general health was greatly improved and the dysmenorrhœa cured. She was examined two years later, when the kidney was found fixed and her health better.

CASE V.—Miss K., aged twenty-three. Healthy as a girl. After lifting a heavy weight felt a pain in her left side. This gradually increased and became very distressing. Her health failed entirely, and she suffered much from digestive disorders and palpitation. She was treated for heart-disease. I saw her in December, 1891. Diagnosed movable kidney, and did nephrorrhaphy in March, 1892. Recovered with complete cessation of all symptoms. I examined her in July, 1894, and found the cure complete.

CASE VI.—Miss E., aged twenty-eight. Slender and delicate as a girl. Health began to fail at twenty-two. Took the rest cure with some benefit. She consulted me in July for menstrual disturbances and severe nervousness. Examination discovered movable kidney on the right side. Operation August, 1892. Gradual abatement of symptoms and remains cured.

CASE VII.—Mrs. M., aged thirty-eight; eight children. Found a lump in her right side. Consulted a physician in Baltimore, who pronounced it a distended gall-bladder. I saw her first in November, 1892. Diagnosed movable kidney. Her symptoms were distress-

ing. Nephrorrhaphy December, 1892. Recovery. Kidney remains fixed.

CASE VIII.—Miss L., aged twenty-six. Healthy as a girl. Was inclined to be stout. Laced to reduce her waist. Began to suffer with dyspepsia and nervousness and lost flesh. Symptoms increased in severity. She grew quite lean and feeble. Consulted me in December, 1892, when I diagnosed movable kidney and commencing hydronephrosis. Operation December, 1892. The kidney was much congested and the pelvis distended. Restoration with fixation relieved all symptoms and restored her health.

CASE IX.—Mrs. H., aged forty-four; three grown children. Health began to fail four years before consulting me. Diagnosis, left movable kidney. Operation January, 1892. Health restored. Kidney remains fixed.

CASE X.—Mrs. P.; widow; aged thirty-one; one child. Four years prior to this time she rode much on horseback, on the advice of her physician, hoping to relieve chronic constipation, dysmenorrhœa, and nervousness. All of these symptoms were intensified. A tumor in the right side was discovered by the patient herself, and I was consulted. She was lean, with relaxed abdominal walls, and a diagnosis of right movable kidney was easily made. Operation August, 1892. It is impossible to wish for a better result than was got in this case.

CASE XI.—Miss R., aged twenty-six. At age of twenty-one began to suffer with irregular menstruation and failing health. Had both local and general treatment without benefit. Consulted me in March, 1892. Found movable kidney and advised operation. Operated April, 1892. Recovery complete and great improvement of health.

CASE XII.—Miss U., aged twenty-two. Healthy as a girl. Began to suffer with abdominal symptoms after an attack of malarial fever. Health became very poor. Frequent attacks of colic, intractable constipation, depression of spirits, and dragging pains in her right side. Examined and diagnosed movable kidney. Recommended nephrorrhaphy, which was done in May, 1892. Recovery complete. Health excellent.

CASE XIII.—Miss T. B., aged twenty-two. A slender young woman, whose health had been poor for several years. I treated her for six months for gastro-intestinal catarrh and intense nervousness without benefit. At the end of this time I made an examination and found right movable kidney. Operated on her in October, 1893.

Her recovery was prompt and complete. Remains well and enjoys perfect health.

CASE XIV.—Mrs. M., aged twenty-five; one child. Consulted me in August, 1893, for what she thought was consumption. She had a cough and gastro-intestinal disturbances. Physical examination of the chest disclosed no disease there. The right kidney was freely movable. Nephrorrhaphy November, 1892. Cough disappeared and general health restored. Rapid increase in body weight. The kidney remains fixed and her health excellent.

CASE XV.—Mrs. L. F. (N. C.), aged twenty-three; two children. Consulted my friend, Dr. Long, for pelvic trouble. She had been an invalid for a year. The larger part of this time she spent in bed. She was markedly hysterical and despondent. Diagnosis, right movable kidney, endometritis, retroflexion, and salpingitis of the left side. I operated on her in April, 1894. In this case I accidentally opened the peritoneum. The small cut was closed, and no harm resulted. She made a satisfactory recovery. Later Dr. Long culretted, removed the left tube and ovary, and stitched the fundus to the anterior abdominal wall at one sitting, from which she likewise recovered. Her health is much improved, but not vigorous as yet. Dr. Long examined her three months later, and reports great improvement in her symptoms. The kidney remains fixed.

CASE XVI.—Mrs. L. E., aged thirty-one; twice married; four children by first husband; none by second. I attended her in the first three labors, which were easy and natural. After her fourth labor her health began to fail. Suffered dragging pains in the abdomen. Had frequent and violent attacks of colic and was exceedingly nervous. Resided nine months in Baltimore, and there, in April, 1894, had a vaginal hysterectomy performed for what was said to be cancer of the uterus. In August of this year she consulted me for what she supposed to be an ovarian tumor. I found a freely movable right kidney. Attributed present symptoms to this, and advised operation in the fall. Operated October 24. Recovery from operation prompt. It is too early to say what the result will be.

CASE XVII.—Miss L. H., aged twenty-one. Delicate girl. Suffered much at menstrual periods. Consulted Dr. Southgate Leigh, of Norfolk, in the summer of 1894. Movable right kidney was diagnosed. I saw her in September, and confirmed Dr. Leigh's diagnosis. Also diagnosed renal calculus. Two weeks after I saw her she had an attack of renal colic, and passed a gravel as large as

a pea. Nephrorrhaphy October 27. Delivered the kidney through the wound and critically explored the pelvis. Found no other calculus. Completed the operation by closing the external wound. This is the only case in which I departed from the open method of treatment, and is the only one in which I had suppuration and was obliged to reopen the wound. This case is still in the hospital, and is rapidly improving.

PERITONITIS IN THE MALE AS A COMPLICATION OF GONORRHŒA.¹

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GONORRHŒA in the female is generally regarded as a serious disease. Its involvement of the Fallopian tubes, followed by attacks of local peritonitis, will frequently subject the woman to a life of semi-invalidism or to the risks of a laparotomy. In rare cases a pyosalpinx leads to a fatal termination. Gonorrhœa in the male, however, is not always recognized as a disease which may be followed by serious complications. It is regarded as a disease which is tedious and difficult to cure, but we are apt to forget that not uncommonly serious and occasionally fatal results have followed the invasion of the male urethra by the gonococcus. A double epididymitis, resulting in sterility, a cystitis, a pyelitis, or a pyonephrosis, an extensive supuration of the pelvic connective tissue, with burrowing upward as far as the ribs, or downward as far as the knee, and, finally, peritonitis, either local or general, are some of the grave and possibly fatal complications of a specific urethritis. It is of this last complication, peritonitis, that I wish to report a case. While it is true that this accident is a rare one, yet a sufficient number of cases have been recorded, and several of them confirmed by autopsies, to impress upon us the importance of bearing in mind the possibility of this grave complication.

Gonorrhœal peritonitis was first mentioned by Hunter in 1786. In his opinion it was due to an extension of the disease along the vas deferens to the peritoneum. Since his publication

¹ Read before the New York Surgical Society, November 28, 1894.

at least thirty such cases have been reported. Inasmuch, however, as the majority of these have terminated in recovery, we may argue, I think, that the peritonitis must have been localized, or at least was not of the general suppurative form.

Nine cases, however, have been reported, where a gonorrhoeal peritonitis has terminated in death. In eight of these the diagnosis has been verified beyond a doubt by either autopsy or operation (autopsy in six, operation in two), and in the ninth case all the symptoms were of such a character that the diagnosis was as certain as any medical one can be unless fortified by autopsy or operation. In the two cases in which laparotomy was performed, one ended in recovery (Lienard's), and the other in death (McCosh's). At the end of this article are given the references where the reports of these nine cases which I have collected can be found.

CASE.—*Urethritis; Prostatitis; Periprostatic Suppuration; Peritonitis; Laparotomy; Death.*—J. P., aged forty-two; married. In the early part of March, 1892, he felt an "irritation of his urethra and some pain on defecation," and in order to be relieved he entered one of the hospitals in this city, where urethral sounds were passed daily for several days. He experienced so much pain from their use that at the end of five days he left the hospital. I have been unable to obtain the history of this period, but presumably he was suffering from a chronic inflammation of the deep urethra, with probably a subacute form of prostatitis. After leaving the hospital he apparently considered himself cured, and stated that, on March 20, he felt perfectly well. On the morning of March 21 he was attacked by a pain in his perineum, which increased markedly during the day, so that at night he could scarcely walk or sit down. On the 22d he presented himself at the Presbyterian Hospital Dispensary, and was seen by Dr. F. T. Brown, who made a very careful examination, and I am indebted to him for notes of the case at this period. A slight urethral discharge was present, but on examination no gonococci were found. The pain located in the perineum was severe, so that he had been unable to sleep. Urination was frequent and difficult. In order to urinate he was compelled to put his hand behind the anus and press upward the anal and prostatic region; the urine then came in short

jets. A soft catheter was passed, and three ounces of residual urine drawn.

Urine passed by urethra was cloudy, opaque, with copious sediment or *détritus*; that drawn by catheter was clear and free from sediment. Specific gravity 1025; acid. The microscope showed pus, blood, epithelial cells, and amorphous tissue.

The catheter met no obstruction, but pain was experienced as it passed the membranous and prostatic urethra. External examination revealed a point of tenderness on the left of the urethra, and pain on pressure on the prostatic portion. The left spermatic cord in the upper part of the scrotum, and as high as could be reached in the inguinal canal, was as large as the forefinger, and indurated. Rectal examination showed the left seminal vesicle somewhat nodular. The prostate was slightly enlarged and tender. Under appropriate treatment by rest and anodynes the patient improved, though for several days there was a very profuse, purulent, urethral discharge, slightly blood-stained. At the end of two weeks he considered himself well, and gave up treatment. About a week later (April 10) he returned, suffering from a relapse, the symptoms again being those of an acute prostatitis. After a few days treatment he again disappeared, and was not heard from until brought to the hospital by ambulance, about midnight on April 26. He stated that on the 24th he had a chill and a discharge of pus from the rectum. On the 25th he began to experience pain in the lower part of the abdomen, which on the day of his admission became very severe, and was accompanied by vomiting. On admission his temperature was 102° F.; pulse 100; respiration 26. He had the appearance of a patient suffering from shock, surface cold and clammy, and pulse feeble. He complained of severe abdominal pain and tenderness on pressure. The abdomen was hard, distended, and tympanitic. On rectal examination the prostate was felt to be moderately enlarged, and on each side of it, especially to the right, was felt a hard mass, apparently of inflammatory tissue.

The diagnosis was made of septic peritonitis, due probably to rupture of a periprostatic abscess. Laparotomy was advised, but consent to the operation could not be obtained until the next day, when the patient's condition was markedly worse. He was troubled with persistent hiccough and occasional vomiting. Stimulants had been given by the rectum, and his pulse was not perceptibly worse, beating about 96 to the minute. The temperature was 101½° F. His general appearance, however, gave the impression that he was a seriously

sick man. Operation was agreed to, and at 3 P.M. it was performed under chloroform anæsthesia. The abdomen was opened in the median line between the umbilicus and symphysis pubis by an incision three or four inches long. The peritoneum was much thickened and agglutinated to the intestines, which were matted together, and covered by a thick layer of lymph. When a free opening had been made into the peritoneal cavity—and this was accomplished with considerable difficulty—a quart of purulent fluid mingled with flakes of lymph escaped. The intestines were enormously distended, the walls deeply congested, thickened, purplish, and coated throughout the greater part of their surface with a layer of fibrin as thick as blotting paper, which could be peeled off in long strips. In places they were agglutinated, and on separating the coils fresh accumulations of pus escaped. In the right side of the pelvis there was a specially large accumulation, and here the intestines were more adherent, and large masses of a fibrinous exudation were washed out and removed. The total amount of purulent fluid which poured out was estimated at three quarts. In the mean time the incision had been enlarged, and the hand passed down into the pelvis. The finger passed into a cavity of considerable size, situated between the rectum and bladder, somewhat to the left. This had evidently been an abscess cavity, and it was bounded on the left by the rectum, above by the base of the bladder, below by the perineum and ischio-rectal fossa. At the lower and inner side was felt the enlarged prostate surrounded by inflammatory tissue. On tilting the pelvis upward and casting into it the electric light, it was seen that the abscess cavity was partly under the peritoneum, which had been pushed upward until evidently it had been perforated by the pus, which had either escaped at once into the general peritoneal cavity or into a space shut off from the general cavity by adherent intestines into which it had afterwards ruptured. Between the finger pushed down inside the pelvis to the bottom of this cavity and the finger of the other hand pressed against the perineum, just above and to the right of the anus, not more than half an inch of tissue intervened. No opening into the rectum could be discovered. The intestines, which had been entirely removed from the abdomen and kept in hot towels, were now, as was the entire abdominal cavity, washed out with boro-salicylic solution (Thiersch). The intestines were then returned with difficulty, and the incision closed with the exception of a space at its lower end, through which a glass drainage-tube passed down into the pelvis. An opening was made in

the lateral wall of the abdomen in each lumbar region, through which rubber drainage-tubes, eight inches long, were passed.

During the latter part of the operation the patient's pulse became very feeble, and he was freely stimulated hypodermically and per rectum. He rallied, however, from the shock, and on the following morning his condition was encouraging. The abdomen was irrigated with hot water every two hours, and the drainage seemed to act well, for by temporarily blocking the ends of the tubes water could be forced into the abdomen until the distention was so marked that it interfered with respiration, and then on releasing the ends of the tubes, the fluid, cloudy and mixed with particles of fibrin, would spurt out with considerable force. During the day of April 29 the vomiting became more persistent, and nothing could be retained by the stomach. On the 29th the patient's pulse became weaker. His mind was still clear, but towards evening he gradually sank, and died fifty hours after operation.

Laparotomy in this case was rather a desperate procedure, but without it the man was doomed, and his life was not shortened by the procedure.

It is a question in such case by what route the infection reaches the peritoneum. Probably it is not the same in every patient. In some the seminal vesicles seem to have been the source of the infection, in others the spermatic cord, in others the poison seems to have been carried to the peritoneum by means of a pelvic lymphangitis, while in still others a pelvic phlegmon, generally in the nature of a periprostatic abscess, has caused the infection either by continuity or by rupture of the abscess into the peritoneal cavity. In my own case this latter method was the one pursued by nature. Had a bacteriological examination been made in more of these cases the track of the infection could be determined with greater accuracy. It seems to be still an open question whether or not the gonococcus alone is capable of exciting a septic inflammation of the peritoneum. In the only two cases in which I can find reports of bacteriological examinations there was positive evidence of a mixed infection; in my own case staphylococci and streptococci were abundant, while in the case of Dr. Challan de Belval micrococci and other bacteria were found. Where the pyogenic bacteria are present

it is proof that a secondary infection has occurred, most probably from the rectum, and in such cases the evidences point to suppuration of the connective tissue of the pelvis as the cause of the peritonitis. On the other hand, could it be determined that the gonococcus was the only bacterium present, the probabilities would favor infection along either the spermatic cord, vesiculæ seminales, or possibly bladder. It is of the greatest importance, therefore, in order to settle these points, that an accurate bacteriological examination of the exudate should be made. In the majority of cases where the mode of entrance of the poison has been proved by operation or autopsy, an abscess of the prostate, followed by a periprostatic suppuration, has been found as the source of the infection, perhaps, in one or two cases, by continuity, but generally by direct rupture of the abscess into the peritoneal cavity. As a rule, the periprostatitis begins in the connective tissue between the prostate and bladder, the pyogenic bacteria having probably emigrated from the rectum. More rarely the inflammation begins on the sides of the prostate or between that gland and the bladder. The phlegmon thus started, if it fails to open into the bladder, rectum, or perineum, burrows upward, and the pus may infiltrate extensively the retroperitoneal connective tissue, or, pushing the peritoneum upward, eventually burst through it and start a local or general suppurative peritonitis.

The symptoms are similar to those of septic peritonitis from any other cause. Collapse at the moment of rupture does not seem to have been one of the phenomena in these patients. As a rule, the peritonitis has appeared somewhat late in the course of the disease, generally in the third, fourth, or fifth week. The prognosis, of course, if general peritonitis exists, is absolutely bad. If the general cavity has been shut off by a wall of adherent intestines a localized intraperitoneal abscess may form, which may rupture spontaneously into rectum, bladder, or intestine, or may be opened by the surgeon, as has been done in several cases with favorable results. As regards treatment, immediate laparotomy is indicated as soon as the diagnosis has been made. Delay will be fatal. The operation, if done at an early date, will give the patient a reasonable chance for recovery, and

even in cases which appear rather desperate it should be attempted, as it affords the patient his only chance for life, which, even if it be a very slight one, should be accepted.

In collecting the accompanying list of fatal cases I am indebted to the valuable articles of Faucon¹ and of Zeissl.²

FATAL CASES.

- (1) *Peter*: L'Union Médicale, 1856 (service of Velpeau).
- (2) and (3) *Goddard*: Gazette Médicale de Paris, 1856, p. 294 (reported also by Ricord and by Fournier, in Dictionnaire de Méd. et de Chir. prat., 1866).
- (4)³ *Guyon*: Gazette des Hôpitaux, 1856, p. 486.
- (5) *Rougon*: L'Union Médicale, 1876, p. 651.
- (6) *Dransart*: Le Progrès Médical, 1873, p. 15.
- (7) *Lienard*: Arch. de Méd. militaire, August, 1889 (reported by Challan de Belval).
- (8) *Wendelin*: Virchow's Jahresbericht, 1872, p. 623 (reported by Zeissl in Annales des Maladies des Organes Génito-Urinaires, July, 1893).
- (9) *Challan de Belval*: Journ. de Méd. et de Chir. prat., 1893, p. 456.
- (10) *McCosh*: ANNALS OF SURGERY, February, 1895.

¹ Archives Générales de Médecine, 1877.

² Annales des Maladies Génito-Urinaires, July, 1893.

³ It is possible that cases (1) and (4) are the same patient. They have been repeatedly quoted as different cases, but each occurred in the service of Velpeau.

REPORT OF A CASE OF STAB-WOUND OF THE
PERICARDIUM, TERMINATING IN RECOVERY
AFTER RESECTION OF A RIB AND
SUTURE OF THE PERICAR-
DIUM.¹

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THE caption of this paper would give a better idea of its contents had I given it the title of Stab-Wounds of the Thorax ; for, in addition to the history of the case of pericardial injury, I discuss thoracic stab-wounds in general.

Eugene L., aged twenty-two, entered the City Hospital, September 6, 1891, with the following history :

One hour before admission, while engaged in a fight, he was cut in the left breast, the injury being followed by a feeling of faintness and nausea. When admitted to the hospital, a wound half an inch in length was found an inch and a half above the left nipple. There was little hæmorrhage from the wound. Percussion showed normal cardiac dulness. The percussion of chest showed absence of dulness.

The wound was cleaned and a dressing of antiseptic gauze applied. Temperature was 99.5° F., pulse 110, respiration 28.

Ten hours after admission to the hospital temperature was 101° F., pulse 112, respiration 40. Percussion now gave dulness over entire left side ; respiration was superficial. The patient complained of considerable pain.

He was taken to the amphitheatre and the dressing removed.

¹ Read at the Mississippi Valley Medical Association Meeting at Hot Springs, Ark., November 23, 1894.

As soon as this was done, blood and air gushed from the wound with each respiration.

An incision eight inches in length was made over and parallel to the fourth rib, and *six* inches of the rib resected.

The bleeding intercostal artery was tied. The pleural cavity was full of clotted and fluid blood, which, with each inspiration, gushed from the large wound with alarming force. By turning the patient on the left side, and using a long pair of forceps armed with a sponge, I was enabled to remove the blood from the pleural cavity.

The patient was turned upon his back, and by the aid of strong retractors a transverse wound of the pericardium, *two* inches in length, was revealed. At the inner angle of the wound the pericardium was penetrated to the extent of half an inch. The balance of the wound failed to penetrate the cavity.

By the use of two pairs of long forceps I was enabled to grasp the pericardium a little beyond each angle of the wound and draw it fairly well up to the surgical wound. Of course the pericardium would rise and fall with each pulsation of the heart.

With a long needle-holder, armed with a sharply-curved needle and catgut, I was able, with very great difficulty, to close the pericardial wound by continuous suture.

Great difficulty was experienced in following the up-and-down movements of the pericardium, caused by the heart pulsations.

After many attempts, I finally succeeded in closing the wound. The pleural cavity was thoroughly irrigated with hot sterilized water, the surgical wound closed, and an antiseptic dressing applied, over which was placed a cotton bandage, followed by a wet crinoline bandage; the latter being firmly applied. No drainage was used.

At the end of operation, which consumed an hour, the pulse was 140, respiration 60.

During the operation the respiration was 60 and very labored, the pulse 140. One hour thereafter the pulse was 100, temperature 99° F., respiration 28.

At several stages of the operation the patient seemed to be dying; hypodermic injections of whiskey and strychnine were then employed.

Before closing the pericardial wound I inserted the index finger, but could not discover that the knife penetrated the heart. There did not seem to be an unusual amount of fluid in the pericardium, hence I did not believe that it contained blood; however, no extended

examination was made in this direction, as the patient's condition was so grave as to necessitate the completion of the operation at the earliest possible moment. The pericardial wound was not bleeding.

The patient made an uninterrupted, rapid recovery. In fact, there was little of interest to record in the subsequent history of the case.

With the exception of three other cases, my experience in operating for stab-wounds has been confined to the abdomen.

When such wounds penetrate the abdominal cavity, we would be inexcusable, aye, criminally negligent, did we not enlarge the opening and *see*, not guess at, the existing condition. But in stab-wounds of the thorax we would not be justified in opening the cavity without the supervention of grave symptoms, such as hæmorrhage, dyspnœa, rapid pulse, etc.

The presence of hæmorrhage can be readily determined by percussion.

It must not be forgotten, however, that, like the peritoneum, the pleura can take care of a good deal of blood; therefore, unless other grave conditions arise, operative interference would not be indicated.

In my experience at the City Hospital, I saw a number of cases in which almost the entire pleural cavity was filled with blood after gun-shot, stab-, or other wounds, the patients recovering without operation.

In stab-wounds of the thorax, the rule of non-interference, without grave symptoms, would not hold good, if such injuries be low down. Here we may have the knife-blade passing through the diaphragm and wounding abdominal viscera; for, as all know, such injuries may exist with few, if any, grave symptoms.

In such cases it would be the part of wisdom to resect a rib, and thoroughly inspect the contiguous diaphragmatic surface. This we can readily do, anteriorly and laterally; but, I imagine, we would experience great difficulty should the wound be in the back.

Should peritoneal penetration be established, we should make a *two*-inch incision, an inch below the costal border. This

would enable us to remove and inspect the viscera in the vicinity of the wound. Should the blade penetrate the convex surface of the liver, the better procedure would be to enlarge the diaphragmatic opening and sew up the hepatic wound.

As I have pointed out in several papers, in closing wounds of the liver it is necessary to use a sharply-curved needle armed with heavy catgut, taking care to enter the needle an inch from the edge of the wound, passing it in as deeply as possible, and bringing it out an equal distance on the opposite side. In tying the catgut, it is very important not to tie it too tight, simply tightening it sufficiently to bring the lips of the wound in apposition. Tying the suture too firmly would, of course, result in cutting through the very friable liver tissue.

In the *Journal* of the American Medical Association, November 15, 1890, will be found the report of a case in which I did this operation successfully. In addition to the hepatic wound, the patient received a stab-wound of the ileum, which was closed in the usual manner.

In the *Medical Mirror*, the date of which I do not now recall, will also be found a report of a case where I followed this rule in dealing with a wound on the left side. In this case the knife-blade passed through the thorax, diaphragm, and into the spleen. The resection of the rib in this case revealed omentum protruding through the diaphragm. An incision four inches long, an inch below the costal border, disclosed a wound of the spleen, which was closed with catgut suture. Both of these patients recovered.

This case, with its treatment, seems to me to present several important and interesting features, and I believe that some useful lessons may be drawn from it.

Regarding the case of penetrating stab-wound of the pericardium, we are struck with the absence of what are usually considered classical symptoms. There was no cough, no dyspnoea, no increase of cardiac dulness over the lung. Shock was moderate or altogether absent; temperature was slightly elevated, and pulse was accelerated; both facts might have been accounted for by the excitement and late violent exertion of the patient.

The severe hæmorrhage from the fourth intercostal artery came on several hours after the injury, and then we find the temperature, pulse, and respiration all increased.

The bleeding vessel was easily caught and tied, after removal of a considerable portion of the rib.

Just here the question of selection of method for control of such a hæmorrhage might come up. This might have been possible by packing, by compresses, by ligature thrown around the rib, or by a combination of these methods. But the chest cavity was filled with blood, and the patient in imminent danger from that source, as well as from a continuation of the bleeding. Then, too, we did not know that the bleeding came from the severed artery alone.

This fact was made our warrant for a large opening through which the effused blood could be removed and pressure upon the lung and heart relieved. This object was easily and rapidly accomplished.

It was at this point in the operation that the wound in the pericardium came into view and demanded its share of attention. I might have let it alone, and trusted to Providence, luck, or adhesions to shut it off from the injured pleural cavity, and prevent its possible infection by that route. But adhesions are at best uncertain, and an adherent pericardium is usually uncomfortable.

I had no precedent to guide me, no authority to uphold me in attempting to sew up this wound over a heart that was beating at the rate of 140 per minute. However, I thought then, and still think, that my patient had a better chance for recovery after the wound was closed. Not only this, but I am sure that his chances for complete restoration of the cardiac functions were a great deal better than they would have been if his wound had been allowed to take its own course, and had fastened itself to the first organ that presented.

Medical literature seems to be singularly barren upon this particular form of injury. Most of the standard text-books dismiss the subject of wounds of the pericardium with a line or two, merely saying that such wounds are usually followed by pericarditis. Yet I doubt if these injuries are so rare or so unimportant as this would seem to imply.

In my own case a few points seem worthy of further remark. When first seen (an hour after the injury was received) no evidence of severe hæmorrhage was noted. It was ten hours later before decided symptoms of trouble, enabling us to make a positive diagnosis of a penetrating wound of the chest, developed.

The wisdom of closing the pericardial wound may be open to question. The considerations which led me to adopt that course were dangers of infections from the pleural cavity, and prevention of adhesions either to heart-wall or pulmonary pleura. The result seems fully to justify the rather difficult and prolonged manipulation.

Without such closure I think the patient *might* have recovered, but certainly his chances for complete recovery without a crippled heart were vastly improved by immediate and aseptic suture of the pericardial wound.

COMPLETE RECTAL PROLAPSE TREATED BY VENTRO-FIXATION OF THE RECTUM.

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THE patient, Kusu Das, a Hindu, aged thirty-two, a native of Chanabali, in Orissa, came to me on September 14, 1894, with complete prolapse of his rectum. He was a house-servant by occupation. He stated that four years ago he noticed a slight extrusion of the bowel on defecation; this steadily increased in size. He was always able to replace the prolapse and retain it till the next call to stool; but latterly on the slightest exertion the rectum would come down. In consequence he was now unable to work, and he had steadily lost weight. In February, 1894, he had an attack of dysentery lasting one week, but he had never any previous attack. He never had any difficulty in micturition, his bowels were opened regularly every day, he never suffered from constipation, and he had not been troubled with intestinal worms since infancy. The family history was negative, and his habits of life were regular in the extreme. He had never touched alcohol in his life, and was almost entirely a vegetarian.

On examination, he was a spare, poorly-nourished, delicate-looking man, apparently much older than his avowed age. He was five feet three and a half inches in height, and weighed only seventy-nine pounds. There was a complete prolapse of the rectum, six inches in length, and eleven inches in circumference. The mucous membrane, which was in numerous circular folds, was covered with slimy mucus, and was bleeding slightly at several small points. There was no particular pain or tenderness on handling the prolapse. The orifice of the bowel was directed towards the coccyx, it easily admitted the finger, and no thickening could be felt in any part of the prolapse on palpation with the finger in the bowel. In the lithotomy position the prolapse was with some difficulty replaced and retained. There was complete atony of the sphincter. There was no sign of any external

piles or rectal polypus. In front of the sternum was an irregular mass of keloid, and above the right nipple a second mass; both arose from scars produced in infancy. The heart and other organs were healthy, and the urine was normal.

The patient consented to operation, and was prepared accordingly, an aperient being given, and the skin of the abdomen carefully cleaned.

On September 16, in the presence of Dr. William Coulter, of this city, and of Surgeon-Captain W. C. Poole, A.M.S., chloroform was administered, and an incision was made three inches in length, parallel with and two inches internal to Poupart's ligament, the omphalo-spinous line crossing the centre of the incision. The parietes, which were very thin, were carefully divided down to the peritoneum; the bleeding was slight and easily stopped by torsion. The peritoneum was opened, and the large intestine was picked up. The gut was greatly hypertrophied, and the meso-sigmoid and meso-rectum were very long. The large intestine was followed along downward, and pulled until the upper part of the rectum was felt to be drawn up to the wound quite taut and straight. The forefinger was passed to the bottom of the recto-vesical fold, and the peritoneum could there be felt thrown into numerous pleats. The skin being retracted, two needles armed with stout-corded silk were passed through the abdominal muscles and peritoneum, one inch from the lower margin, and one-half inch from the two extremities of the original incision; the needles were then passed and returned through the meso-rectum, and back again through the abdominal muscles; when tied they formed two strong mattress sutures. By this means the bowel was kept taut, and the prolapse reduced, also by fixing the meso-rectum to the lower margin of the incision the bowel hung over towards the middle line. The peritoneum was then united with fine silk sutures, which were also passed through the adjacent appendices epiploicæ, with the view of strengthening the adhesions of the bowel to the abdominal wall. The muscles were then sutured separately with fine silk, and the skin with silkworm gut. The wound was dressed with boric acid gauze and salicylic wool, and a binder applied.

The recovery from the operation was uncomplicated, except by a small stitch abscess, which appeared on the fifteenth day, and from which a few days later one of the silk sutures was discharged. He defecated daily without any recurrence of the prolapse.

October 14. He was allowed to get up for the first time. Per

rectum, the sphincter had quite recovered its normal tone, and the bowel felt healthy in every respect.

November 6. The patient weighed 104 pounds. There was no sign of recurrence of the prolapse, and the abdominal scar had already begun to show marked keloid thickening. There was no appearance of ventral hernia, and he had resumed work wearing a flannel belt.

This operation was, I believe, first recommended by Mr. H. W. Allingham, of London, in 1888, in the fifth edition of the work he edited on "Diseases of the Rectum," p. 187. It recommended itself to me as the best procedure to follow in the above case in preference to all other operations. I did not consider that in his weak, delicate condition the patient would have borne the shock of excision of the prolapse. As it was, the shock was very slight and the hæmorrhage practically *nil*. Again, there would have been great difficulty with him in maintaining strict asepticity in an anal wound. In the above operation the chance of acute bending of the bowel taking place at the fixation point was obviated by using two mattress sutures, two inches apart, to fix the meso-rectum.

Calcutta is sorely handicapped by the want of a good medical reference library, and I can only find here one reference to a somewhat similar operation, performed by Dr. Kenneth McLeod, late of this city,¹ though, doubtless, others since 1888 have acted on Mr. H. W. Allingham's suggestion for the operative treatment of these cases.

McLeod's case was in a Hindu, aged nineteen, who suffered from a large prolapse. Treatment by making linear eschars with the cautery having failed, after reducing the bowel, the left hand was passed into the rectum and pushed upward till it impinged against the abdominal wall. Two steel acupressure needles were then passed through the abdominal parietes into the bowel, and guided by the fingers of the left hand in the bowel were pushed on through the parietes again. A linear incision was then made in the skin and muscles over the bowel thus fixed up down to the

¹ *Vide Lancet*, 1890, Vol. II, p. 117.

peritoneum. A triple row of silk sutures was passed through the parietal peritoneum bulging in the wound, and through the serous and muscular coats of the gut, the fingers in the bowel guiding the needle, and preventing perforation of the mucous coat. The skin and muscles were finally brought together again. In twenty-four hours the two needles were removed. The patient recovered, and the result was a complete success.

In my case, where the bowel was hypertrophied and the peristaltic action very strong, it is doubtful if fine sutures passed through the outer coats of the bowel would have held without tearing through. This mishap I remember seeing in a case of inguinal colotomy for malignant stricture of the rectum, where in three days nearly all the sutures had been torn away from the abdominal incision by the strong peristaltic action of the hypertrophied bowel. This would not have taken place if a strong meso-sigmoid suture had been passed to make a spur.

In my case I considered thick silk sutures through the meso-rectum would meet every requirement.

The openings into the bowel, made by the acupressure needles in McLeod's method, might, perhaps, also have become stretched by the same peristaltic force and allowed of faecal extravasation.

REPORT OF A CASE OF PATHOLOGICAL SEPARATION OF THE LOWER EPIPHYSIS OF THE FEMUR.¹

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SEPARATION of an epiphysis is a condition that may occur either on account of trauma or disease. There seems to be a difference of opinion by writers as to the frequency of its occurrence, especially as the result of trauma. As the result of disease of the bones, osteomyelitis, it is considered a not infrequent accident. Bruns² has collected 81 reported cases. Of these cases 28 were of the lower end of the femur. Next in order came the lower end of the radius, 25 cases; the lower end of the tibia and the upper end of the humerus, each 11 cases. The ages recorded in 52 cases were 8 between one and nine years, 44 between ten and nineteen years, the greatest frequency being at the sixteenth year. Marquat³ collected 106 cases, 20 of which were of the lower end of the femur. The ages were between birth and the sixteenth year.

From the above statistics we see that the traumatic separation of the lower end of the femur occurs in about one-fifth to one-third of all the reported cases; in the majority of cases previous to the sixteenth year, seldom later.

The forces that are necessary to produce this separation are various. Thus, during childbirth, traction may produce it. Volkmann states that he has produced it when the hip is diseased, when making rotation in seeking for crepitation or extension in

¹ Read before the Mississippi Valley Medical Association at Hot Springs, Ark., November 19, 1894.

² Hand-Book of the Medical Sciences, Vol. III, p. 234.

³ Stimson, p. 539.

the application of plaster-of-Paris dressings. Other forces are, in direct external violence, usually of a twisting character, or lateral or at right angles to the axis of the limb.

It is of interest, in relation to these cases, to note the various opinions as to the direction of the dislocation of the ends of the separated epiphysis. Tillmans states that in the majority of cases the epiphysis is pushed forward and the diaphysis backward into the popliteal space. The same condition prevails according to the observations of cases as reported by Coural, Little, Voss, Buck;¹ Kœnig also notes the same direction of the fragments, very seldom the opposite. The readiness with which the dislocation of the separated diaphysis into the popliteal space occurs can be explained (1) on account of the anatomical structures of the surrounding parts; (2) the force and position of the patient; the popliteal space being the direction of least resistance, while on the anterior aspect we have the strong quadriceps tendon, the patella, and the ligamentum patellæ. The patient being usually on the feet at the time of the accident and in the process of falling forward or sidewise, may also determine the direction of the shaft pushing the lower end in a downward and backward direction. This backward dislocation of the diaphysis, as far as the prognosis of the case is concerned, is of importance, on account of the pressure that may be brought to bear on the popliteal vessels, interfering with the circulation so that amputation becomes necessary, as in several of the cases on record. On the other hand, where the diaphysis is pushed forward onto the trochlear surface of the condyles, the popliteal vessels are not as liable to be disturbed in their normal relation, and are protected from pressure by retaining their normal relation to the intercondyloid notch of the condyles.

The occurrence of pathological separation of the epiphyses is regarded by writers on surgical pathology and diseases of the bones as a not infrequent accident in diseases of the bones and joints. It is noted in osteomyelitis of the long bones. It occurs in consequence of necrosis, inflammatory osteoporosis, or molecular disintegration of bone in the epiphyseal line.² The time of

¹ Hamilton, Fractures.

² Senn.

the separation is about the fifth or sixth week. In Billroth's "Surgical Pathology" a case is cited of separation of the lower end of the femur, analogous to the one I report.

On account of the comparative rarity of diseases of the bones in this country, the opportunity of observing pathological separation of the epiphysis is quite rare. The following case of pathological separation of the lower end of the femur is therefore of interest.

Lena B., aged thirteen; a resident of Welden Springs, Mo., was admitted to Rebekah Hospital October 8, 1894, with the following history: About the 11th day of November, 1892, the right knee began to be painful. Five days later the knee began to swell. Six weeks later the knee was lanced on inner aspect, giving vent to a free discharge of pus. Two months later knee was lanced a second time, but with little discharge of pus. In March, 1893, the bone began protruding through the skin. Since the second lancing pieces of bone were discharged through the wounds. The leg had not at any time been placed in a position of rest on a splint.

Her maternal grandfather and several maternal aunts died of consumption. Her father's family were healthy. Both her parents were living and well.

The patient is a pale, blue-eyed, flaxen-haired child, with very delicate skin. When admitted her temperature was normal; body emaciated. The right knee was flexed at an obtuse angle; joint ankylosed. The knee was symmetrically enlarged, and of smooth surface. On the anterior aspect of the knee there was a bony protrusion three-fourths of an inch in diameter and projecting a distance of an inch or more beyond the level of the skin. The bone protruding was immovable, necrosed, and black. At the lower surface of the protruding bone there was a broad splinter of bone which could be pushed to and fro, inward and outward in the axis of the limb. The skin around the bone was bound to its base by scar tissue. On the inner aspect of the knee was a fistulous opening through which the bone beneath could be felt by a probe. The component structures of the joint could not be outlined by palpation, the whole feeling like a solid symmetrical tumor. Manipulation was not painful, neither did the child complain of pain in the knee. (Figs. 1 and 2.) A resection of the knee was decided on.

On October 12, 1894, I performed the following operation: First, two incisions were made following the axis of the limb, beginning below the tuberosity of the tibia and carried above the condyles of the femur, the one on the internal aspect of the limb, the other on



FIG. I (drawn from photograph).—Shows end of necrosed femur projecting and a sequestrum beneath the outer side of knee; A, C, D, line of incision through the skin.

the outer aspect. Two elliptical incisions were made across the knee, both beginning at the inner lateral incisions, diverging, the one below the other above the protruding necrosed bone, and converging

at the outer lateral incision. In the ellipse thus formed on the anterior surface of the knee were included the protruding portion of bone, scar tissue surrounding the same, and an elliptical portion of normal skin. All of the incisions were made down to the bony

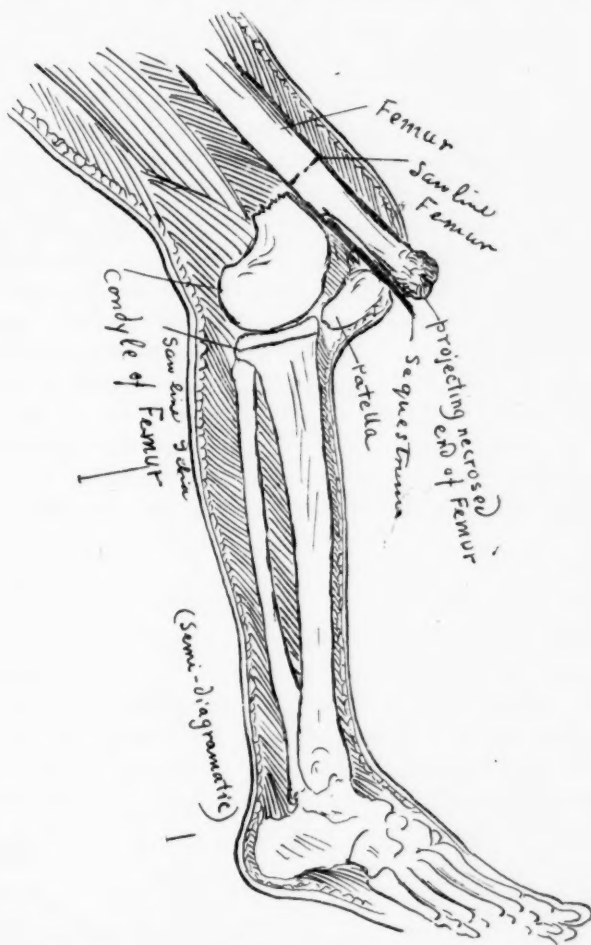


FIG. 2 (diagrammatic).—Showing anatomical relation of parts.

structures with a strong resection knife. The incisions thus modified are practically the H incisions of Moreau, as practised by Ollier. The reason for my making the incisions as outlined—aside from the condition of the parts preventing the incisions of Hahn, Volkmann,

Langenbeck or Textor—was the fact that I wanted to obtain the specimen in its entirety, without destroying the ankylosed joint surfaces. The next step in the operation was the dissecting up of the lower flap, as outlined by the lower elliptical incision and the lower halves of the lateral incisions. This flap was dissected up to below the tuberosity of the tibia. The upper flap, outlined by the upper halves of the lateral and the upper elliptical incision, was dissected up to above the condyles (upper part of the tumor). The bone on the anterior and lateral aspects of the knee was now clear of the soft parts, the popliteal space remaining not interfered with. The next step was to saw through the head of the tibia, freeing the leg. This being done the whole leg was elevated. By means of the knife and elevator the soft parts of the popliteal space were detached from the back part of the knee up to a point where it was intended to saw through the femur. The femur was sawed through as nearly above the condyle as possible. I found in the saw-cut in the end of the femur a cavity lined with fungous granulations, which I removed with a bone curette. I found that into this cavity had projected the upper end of the splinter of bone, which also protruded from the under surface of projecting bone at the front of the knee-joint. I drilled the ends of the tibia and femur and wired them with silver wires.

I found that the soft parts coaptated perfectly. The transverse wound was closely sutured with silk; likewise the upper and lower halves of the lateral wounds. Through the centre of the popliteal space, from side to side, I carried a small-sized rubber drainage-tube. Dressing of iodoform gauze and cotton, and over all plaster of Paris from foot to buttocks.

Reacted well from chloroform. No abnormal temperature until after third day, October 16; morning temperature $100\frac{2}{3}^{\circ}$ F., evening temperature $102\frac{2}{3}^{\circ}$ F. Removed dressing, took out drainage-tube, leaving small pieces in either side of wound. Opened bowels by saline purge.

Until October 22, temperature normal to $99\frac{3}{5}^{\circ}$ F. Wound healed by first intention, except at lower angles and a small stitch abscess in transverse wound.

Progress throughout favorable; at end of third week wounds all healed.

November 14. Patient sits up in bed. Temperature normal; appetite good; sleeps well, and has gained markedly in flesh. Limb still in plaster dressing. Bony union perfect.

[Patient discharged from hospital January 7, 1895, walking on limb; raised shoe; braces extended onto thigh; shortening $4\frac{1}{2}$ inches.]

A careful study of the specimen after removal developed the following facts: The necrotic portion of bone protruding from the anterior aspect of the knee is continuous with the shaft of the femur. At the junction of the necrotic portion with the healthy part of the femur, and corresponding to the site of scar tissue, there is a constriction, or, in other words, a line of demarcation on the bone. The broad splinter extends the whole length on the inner side, from the tip of the protruding bone to the site where the femur was sawed through. The length of normal femur removed and necrotic bone is about three inches. Immediately under the shaft of the femur are the condyles, on the posterior surface of which is the head of the tibia in an ankylosed condition. The under surface of the femur is bound down firmly to the upper surface of the condyles; or, in other words, the shaft overrides the condyles. The condyles are apparently normal. Immediately below the projecting end of the femur and the head of the tibia is situated the patella, displaced a little to the left. No evidence of new formation of bone or pathological changes. The patellar ligament has been changed to a mass of fatty tissue by fatty degeneration. Patella healthy.

From the foregoing study of the specimen, we can draw the following conclusions as to what had taken place,—viz., separation of the epiphysis—epiphyseolysis, as Senn calls it—as a result of an osteomyelitis at the epiphyseal line; displacement of the epiphysis into the popliteal space; overriding of the epiphysis by the femur; displacement of the patella; and, finally, crowding forward of the end of the femur, perforating the skin and continuing to be pushed forward until firmly fixed by inflammatory processes. Inflammatory infiltration about the joint structures followed, so as to render a recognition externally by palpation impossible. Gradual discharge of parts of necrosed bone through fistular openings remaining. A sequestrum remaining on the lower surface of femur, as well as necrosed end, corresponding to the site of osteomyelitis at the epiphyseal line.

REMARKS.

In considering traumatic separation of the epiphysis of the lower end of the femur the mechanism was explained, and it was shown that the diaphysis, in the majority of cases, was crowded into the popliteal space. In this specimen, and in an analogous case quoted by Billroth, the opposite displacement obtains. The explanation of the manner in which this takes place, to my mind, is the following: The shaft of the femur at the epiphyseal line was the seat of an osteomyelitis. The surrounding structures, especially the joint, may be either specifically or non-specifically involved. We know that flexion of a joint, especially of the knee, takes place whenever there is inflammation in or about it for any length of time, if not prevented by apparatus, such as splints, methods of extension, etc. This took place, and as the case ran on ankylosis (temporary at first) took place, with the knee in a flexed position. By the time separation occurred (about the sixth week) the knee was pretty firmly ankylosed. Granting, now, we have separation of the epiphysis, the leg cannot be elevated by the will of the patient, the thigh being only partially under the control of the will. The leg is not supported except imperfectly by pillows; the occasion to move the patient perhaps frequent. Now, whenever the leg is raised the condyles, being fixed to the tibia, move with it. Owing to the angle that the tibia occupies to the condyles whenever the leg is elevated, the epiphyseal line of the condyles is depressed into the popliteal space and favors the slipping of the end of the femur upon the trochlear surface of the condyles. The action of the thigh muscles, which are attached to the head of the tibia, draws the leg upward with the condyles so that the femur overrides the same. The displacement having occurred, the action of the thigh muscles continues pushing the femur end through the skin, having first pushed the patella and tendon aside. This crowding down of the femur continues until it becomes fixed in this position by inflammatory action. The action of the muscles attached to the neck and trochanters of the thigh-bone also elevates the end of the femur and favors its overriding the trochlear surface of the condyles.

Another question which arises when viewing this case is the following: Is the deformity in this case, due to a separation of the epiphyseal line, a necessary sequence to the osteomyelitis? This may be answered in the negative. If not, how can it be prevented, and how does nature remedy the damage done? The first indication is to keep the parts at rest on proper splints, so as to prevent flexion and movement. If separation does occur, displacement will not take place readily if proper splints and extension have been applied. We well know that nature attempts to be conservative, and we also understand the manner in which she does it. New-formation bone-material is thrown out around the dead bone, forming a casing around it and leaving the dead bone, the sequestrum, on the inside. It is, therefore, possible that the separated epiphysis becomes again united to the shaft by means of the callus thrown out,¹ and that after the sequestrum has been removed—either by nature or by the aid of the surgeon—the limb may again become useful. The proper treatment of inflammation of bone is too well understood to merit attention here.

One important question in a case such as we are dealing with is, Is excision or amputation the preferable operation? When we refer to the statistics of knee resections for tuberculosis, the favorable results obtained are certainly an answer in favor of resection. In cases of typical resection of the knee the epiphyseal cartilages are avoided and subsequent shortening in many cases is not marked. In this case they have been sacrificed and shortening must be expected. In a child amputation would leave a stump that would become small and atrophied, and it would be questionable if an artificial limb could be adapted that would be comfortable and useful. In resection, the long posterior thigh muscles have been in part preserved, and will, to a certain degree, reacquire physiological function. A subsequent amputation when the patient is grown would yield a better stump for the adaptation of an artificial leg than now. In the adult the question of resection or amputation must be considered according to the individual peculiarities of the case. The question, however, is a wide one, and open to much discussion *pro* and *con*.

¹ Billroth.

THE RELATIVE VALUE OF THE MURPHY BUTTON
AND ABSORBABLE PLATES IN INTESTINAL
ANASTOMOSIS.

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NOW that the Murphy button has had a somewhat extensive trial over a wide field of abdominal surgery, it may be worth while to point out certain objections to its use in gastric and enteric work, which are not theoretical, but force themselves upon our attention practically. Certain of these objections were suggested by various surgeons before the button received a trial; and the results have, in a large measure, proved the justness of these predictions.

If we limit its field to cholecystenterostomy there can be little or no difference of opinion as to its value. Here it is a most brilliant device, wonderfully successful, and the greatest advance upon former plans.

But as to bowel-work and stomach-work, I desire to call attention to some cases reported at a recent meeting of the New York Surgical Society, November 14, 1894, by four of its members. These results were announced and discussed in open session and were published in the January issue of this journal, in the society proceedings; and, hence, are public property.

CASE I (Dr. Abbe).—This case was one in which a tumor necessitated excision of the caput coli. Entero-colostomy was performed, using the Murphy button, uniting the end of the ileum to the side of the hepatic flexure of the colon. The patient did well for a few days; then died with symptoms of obstruction. Autopsy showed

that obstruction was due to rather hard fæces blocking the opening in the button.

CASE II (Dr. Abbe).—In this patient colo-colostomy was performed, using the largest ordinary size of round button. The patient recovered, but did not pass the button. Six weeks later a second cœliotomy was done for excision of the offending loop, with tumor; whereupon it was found that the button was retained still in the colon, and on the *wrong* (proximal) side of the anastomosis. Recovery.

CASE III (Dr. Abbe).—Here colo-colostomy was performed. An unusually large button was used, selected by Dr. Murphy himself, and sent to Dr. Abbe shortly before the operation. Result, death from gangrene of gut-wall at the site of the button. Dr. Abbe was inclined to attribute this result to the weight of the button and its size, at least in part.

CASE IV.—Dr. Kammerer reported the case of a patient of his upon whom he did entero-enterostomy (small gut to small gut) end-to-end, using the button. Death after twelve weeks from peritonitis, the button not having been passed meanwhile. Autopsy showed the button retained, and on the *wrong* (proximal) side of the anastomosis; and at this new line of union the ends of the gut separated one from the other upon very slight traction. (This easy separation of the ends he thought possibly due to sepsis.)

CASE V.—Dr. Van Arsdale did a Von Hacker gastro-enterostomy upon a patient, using the round button. Death ten days later, from exhaustion, apparently due to disease. Autopsy showed anastomosis perfect; but button had been retained, and was loose in the stomach.

CASE VI.—Dr. Meyer reported a gastro-enterostomy by Wölfler's technique, and using the round button; patient recovering, and living between two and three months; then dying of acute tuberculosis of the lungs. Autopsy showed the anastomosis still excellent and uncontracted, but the button lying free in the stomach.

It will be noted that these last two cases represent opposite techniques. In the Von Hacker method the new union of bowel with the stomach is at the back of the latter organ. In the Wölfler method, the union is between bowel and front of stomach. By both plans, however, in these cases the button failed to pass, being retained in the stomach.

Whether in the stomach, or in those instances in which the

buttons were, unfortunately, retained in the bowel, it is certain that retention of this large foreign body cannot but be regarded as an element of danger ; and, indeed, it would seem a fair inference that its presence had at least something to do with exciting the peritonitis which caused the death of Dr. Kammerer's patient.

Though probably it may justly be claimed that the contents of the small intestine are always fluid or semifluid, and therefore capable of passing through the rather small lumen of the button, yet in Dr. Abbe's first case we have an instance of death from obstruction of this lumen in joining the ileum with the colon. And it is evident that in colo-colostomy with the button, this is really a risk to be recognized, for here we commonly have *faeces* much more solid than in the small gut.

In nearly all regions,—*i.e.*, gastro-enterostomy, entero-enterostomy, and colo-colostomy,—it is plain, from instances of each here reported, that the danger of permanent retention of the button is a very real one. Let it not be forgotten that these unfortunate cases represent only one meeting of one society, and a very limited use of the button in point of numbers of patients. Of course other and successful cases, perhaps as many more, were also reported.

And now, do the good results quite often obtained justify us in shutting our eyes to these perils, and continuing to use the button in this regional work ?

If we had no equally safe plan, the answer would be plain. But it seems to the writer that absorbable plates, of one or another kind, if used by those skilled in surgical technique, are almost as rapid a device, and are as certain of securing union of coaptated surfaces, after which these plates, their function being performed, become softened, digested, and disappear, instead of remaining in the stomach to cause trouble.

In the September, 1894, number of the ANNALS is an interesting and able article by Dr. William S. Magill, in which this question is discussed, and his conclusion is that the statistics (given by him in detail) of bowel and stomach anastomosis show that by far the best results have been obtained with such absorbable plates.

In the ANNALS OF SURGERY for February, 1893, the writer discusses Senn's bone-plates, their advantages and disadvantages, and compares them with those cut from raw vegetable tissue. The use of turnips for this purpose he alludes to as Dr. Von Baracz's plan. In this article the writer shows that he experimented upon dogs with plates of potatoes, turnips, and a number of other kinds of raw vegetable tissues in the Columbia College Physiological Laboratory during the winter of 1890-1891, and published these experiments¹ a year before Dr. Von Baracz's first case, which was published by him June 11, 1892. However, this is a minor point. The *method*—that of absorbable plates—is Dr. Senn's, to whom the credit of the plan is really due.

I think that, upon reflection, Dr. Senn will admit, being as candid as he is able, that the use of raw vegetable plates is somewhat of an improvement upon those made of decalcified bone, though, of course, the *principle* remains the same. This is true for the following reasons:

(1) The vegetable plates are always obtainable at a minute's notice.

(2) They cost nothing.

(3) They are easily made by anybody with a penknife.

(4) They can without difficulty be made to have a very long opening,—often a desideratum, to guard against stenosis from late contraction. Indeed, with sweet-potatoes, it is easy to cut a plate that shall have a four-inch opening.

(5) They are softened, absorbed, and hence gotten out of the way sooner than bone-plates, which is a great advantage over the bone-plates. Indeed, the latter plates, taking a week or so to absorb, have in one or two instances caused death by sliding on each other, finally, after a number of days, enough to obstruct the opening.

(6) As Magill says, "they are more pliable than bone, easier to preserve, and better brought together in making the anastomosis, slipping much less."

¹ New York Medical Record, June 27, 1891.

Though absorbed in from a day to two or three days, depending on what portion of the alimentary canal they occupy, neither in my own experiments nor in any reported cases have they been absorbed too soon. The most rigid test of this point is, of course, a gastro-enterostomy; and Von Baracz's repeatedly published successes with such plates, in this operation, speak for themselves.

Such plates are best made either of sweet-potato or white potato. Any of the kinds of turnips, while fairly good for the purpose, are comparatively brittle; they cannot be bent so far without snapping; also, being of not quite such firm substance, turnip is not so rigid as potato. The latter tissue, if it has been immersed in warm water for half an hour or so, becomes almost like wood in hardness, and yet does not appreciably swell nor change its shape. I attribute this increased rigidity to absorption of water by the starch granules and their consequent pressure against one another.

Dr. Magill is a little in error regarding the effect of carbolic acid solutions upon such plates, either of potato or turnip, as the acid tends to soften (not harden) them, and should hence not be used. Whether upon prolonged soaking for days in carbolic solution the effect is different I cannot say.

By permission of Dr. G. L. Carden, of Cumberland, Md., I beg to record here two rather recent cases in which white potato plates were used by him, I having a year previously demonstrated to him the technique while he was in New York City.

CASE I.—A male adult, suffering with chronic relapsing appendicitis. Operation, October 27, 1892, showed necrotic cæcum and ulceration at ileo-cæcal junction. Three inches of both large and small gut were removed. It was now necessary to perform ileocolostomy, and this was done by the lateral method, using white potato plates. Result, recovery. In a second letter, received November 10, 1894, Dr. Carden writes, "This patient is still well, and doing manual labor in Ohio."

CASE II.—An old man, "nearly sixty," was operated upon by Dr. Carden, March 8, 1894. The cause of operation was the same as in the preceding instance, chronic relapsing appendicitis. The

conditions found also closely resembled the former case. White potato plates were again used. Result, death, in thirty-eight hours, from sepsis due to rupture of an intestine previous to the operation. An autopsy showed that union at the anastomosis was firm, and no leakage whatever had occurred.

A third recent successful case by this device—this time with turnip-plates—was that of Dr. Von Baracz, an ileo-colostomy in a young man nineteen years of age.

In comparison with suturing pure and simple, to which, notwithstanding its frightful mortality, surgeons in general still cling for some inscrutable reason, almost any plate device is preferable. Dr. Abbe's plan of suturing, described a few years ago by him, in which three distinct rows of stitches are placed about the new opening, requires nearly *thirty inches* of sewing. To do this rapidly and neatly within a moderate length of time is possible for him, but not for less gifted men. A plate operation that would be equally secure can be completed by the average surgeon in half the time. And we must never forget that speed—breathless speed—is a tremendous factor in success in peritoneal work. An exposure of half an hour means a much greater resultant mortality than one of fifteen minutes or less. This, which seems to the writer a truism, is strangely enough contested by certain surgeons here in New York, as will be seen by reference to the discussion on this topic,² these gentlemen contending that a quarter of an hour more or less with the belly opened does not matter.

Upon this one point, as it seems to me, depends the whole question whether, in stomach and bowel work, to use simple suturing about the new opening, or whether, instead, to save precious time, some other device, of which absorbable plates seem the best.

Any surgeon can, with "dateless Olympian leisure," make a tight and eminently satisfactory job of a gastro-enterostomy, or an entero-enterostomy, by suturing alone; and can also subsequently sign a death certificate.

¹ Centralblatt für Chirurgie, July 7, 1894.

² ANNALS OF SURGERY, February, 1893.

In conclusion, the writer begs to submit, as being well worth a second perusal, the following statistical remarks, from Dr. Magill's carefully-prepared article, already quoted. They are quoted with especial reference to gastro-enterostomy alone, simply because in this operation is found the severest test of absorbable plates. And, as the writer, Dr. Von Baracz, Dr. Heigl, and others have shown, vegetable plates are quite as safe as bone ones elsewhere in intestinal work also.

"Of sixty-one gastro-enterostomies, only *one death* has occurred from *insufficient approximation*. This fault was during the experimental stage, before perfection of the details of the method. The cause of the accident was immediately recognized and corrected. Fifty-six operations since the first of January, 1889, where moist plates were used, have not once revealed a fault of approximation.

"No method of *suture* ever gave such a remarkable result. Billroth's statistics of gastro-enterostomy, published in 1891, gave 28 operations, 14 deaths; mortality 50 per cent.—more than double that of Senn's method in the hands of thirty-four *different operators*, many of them trying the approximation for the first time.

"The statistics of Von Hacker, published in 1890, correspond closely to Billroth's,—21 cases; 8 operated by Wölfler's method resulted in 4 deaths, mortality 50 per cent.; and 13 operations by Von Hacker's method resulted in 6 deaths, mortality 47 per cent."

As against these gastro-enterostomies by simple suturing alone stands the table of results by absorbable plates: 61 gastro-enterostomies, 14 deaths; mortality, 22.95 per cent., which is less than half that by the former method.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, November 28, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

HIP-JOINT AMPUTATION FOR SARCOMA OF THE FEMUR.

DR. F. W. MURRAY presented a man, eighteen years of age, who was admitted into the New York Hospital in June, 1894, with an irregular, tender, hard growth, involving the lower third of the femur. The tibia was not involved. The inguinal glands were distinctly enlarged. The first symptom of pain and swelling had been noticed first but four months previously. When admitted, the patient was pale, weak, and thin, and complained of constant pain in the right knee and outer side of that leg and foot.

June 18, disarticulation at hip-joint was performed by the so-called "Wyeth method." Owing to a mistake on the part of the instrument-maker, the pins were only one-sixteenth inch in thickness, and bent after applying the tourniquet. This caused some difficulty in freeing the head of the bone, and one or two vessels in the posterior flap to spurt, otherwise the operation was eminently satisfactory. Very little blood was lost, and the shock was not more than would be expected considering the condition of the patient. Large rubber drainage-tube was introduced through outer angle of wound to the acetabulum, and flaps united by silk suture, sterilized dressing. Heat and stimulants applied after removal to the ward, and in a few hours patient had recovered in a great measure from shock. Some hours after operation temperature rose suddenly to 107° F., but it soon began to fall, and in twenty-four hours was about normal. This was, undoubtedly, an example of the so-called "fermentation fever," and had no deleterious effect on the patient.

The dressing was changed on the second day, and beyond a con-

siderable bloody discharge through the tube nothing was noted. Tube and stitches removed June 27, union *per primam*, excepting at site of tube, where there was an abundant serous discharge. The patient rapidly gained strength, and was soon up and around the ward, and beyond the existence of a sinus at the former site of drainage-tube the stump was in good condition. Early in August, as the sinus still existed and discharged a considerable amount of serous fluid, it was curetted thoroughly and packed with gauze. No improvement followed, and a second sinus appeared in the centre of the scar, on outer side of stump, a few weeks afterwards. August 24, under ether, the outer end of the stump was slit up, the sinuses dissected out, the acetabulum thoroughly curetted, and the wound was packed with iodoform gauze. For twenty-four hours after operation patient did well, when suddenly the temperature rose to 104.6° F. From this time until August 30 the temperature steadily increased until it was 106.8° F. on the latter date, when suddenly it dropped to normal. There was no appreciable increase in the pulse-rate and respiration accompanying this elevation of temperature, and repeated examination of the wound revealed nothing abnormal.

During this period the patient was intensely nervous and excited, and complained of such intense pain in the wound that chloroform had to be administered at each dressing. The wound healed rapidly, and to insure healing from the bottom a drainage-tube leading to the acetabulum was inserted.

His further history was uneventful. The stump is now entirely healed, excepting a small superficial granulating spot where tube was inserted. The general condition is excellent, the patient has gained thirty pounds since operation, and returns next week to work. It is almost six months since the operation. There are no signs of recurrence of the disease, and the enlarged inguinal glands have disappeared. At the operation the shaft of the femur was left intact, and not sawn through, so that the entire limb, used as a lever, facilitated the throwing out of the head of the bone from the acetabulum. The pathologist reported that the growth was a small, round, and spindle-cell sarcoma of the femur. It was limited to the bone, and had not affected the overlying soft parts.

DR. ABBE thought the "bloodless method" of Mr. Spence, of Edinburgh, for which Mr. Cheyne, in the "Edinburgh Hospital Reports for 1893," claims priority over Dr. Wyeth by ten years, and which consists in the use of one skewer and an elastic tourniquet, pos-

sesses some advantages. The skewer traverses the inner half of the thigh, the side on which are all the great vessels, and these are constricted by the elastic tourniquet, applied in figure-of-eight over the skewer ends, leaving the outer half of the thigh perfectly free to be dissected up in reaching the neck of the femur, and in manipulating the bone.

DR. McCOSH said he had used Wyeth's skewers in a case some years ago, and had not found them at all in the way of the operation. Mattress needles, a quarter of an inch in diameter, were used. The operation was bloodless from the proximal side of the wound. There was some difficulty in getting out the head of the bone, because, owing to infiltration of the upper part of the shaft of the femur with sarcoma, it had become separated from the neck before the operation. The skewers did not interfere with the incisions. The muscles surrounding the stump were infiltrated, and large portions were excised, yet there was no recurrence in the stump. The patient died about a year later of multiple metastatic sarcomata, involving the lungs, scalp, lips, etc. Dr. McCosh thought the results in Dr. Murray's case were exceedingly satisfactory with regard to the appearance of the stump and freedom from return.

DR. RUSHMORE said that in a case of malignant disease of the femur operated upon three or four years ago he had controlled hæmorrhage by the Jordan-Lloyd method, and it had proved very satisfactory. The patient was a man past seventy, a sufferer from chronic dyspepsia and chronic bronchitis, had had several attacks of hæmaturia, the disease had already fractured the bone. An attack of pneumonia necessitated the postponement of the operation, yet, except for moderate sloughing in the posterior flap, the patient made a very satisfactory recovery. There had been no return of the disease at the end of four months.

PERITONITIS IN THE MALE AS A COMPLICATION OF GONORRHŒA.

DR. A. J. McCOSH read a paper with the above title. (See page 140.)

Dr. McCosh was asked what was the condition of the patient whose case was related in the paper just before the illness which caused him to be taken to the hospital, and also whether gonococci had been found.

DR. McCOSH replied that the history of the case for the date just referred to was somewhat obscure, although it seemed the man had claimed to be well until a few days prior to his admission to the hospital. Dr. Brown had not found gonococci in the urethra, nor had they been found in the peritoneum at the time of the operation. It is only within the last year or two that bacteriologists have been able to cultivate gonococci with any degree of success, and the failure in this case to find these bacteria in the medium which was inoculated by the peritoneal exudate is no positive evidence that they were not present. The man claimed that the urethritis was not specific, but probably he was mistaken, and apparently the peritonitis was a complication of gonorrhœa.

DR. HOTCHKISS mentioned a case which he thought was probably one of retroperitoneal cellulitis complicating a posterior urethritis. The man had been transferred to Bellevue from another city hospital. He had had deep urethral trouble. Subsequently deep retroperitoneal abscess developed. There were no signs of peritonitis,—all the symptoms were purely septic. After he had been in the hospital about thirty-six hours a peculiar emphysematous swelling appeared in the left groin below Poupart's ligament, which went on to extend upward in the line of the descending colon, with which it was supposed to be in communication, as it had gaseous contents. At the autopsy no communication with the bowel was found, and the conclusion was reached that the case was originally one of deep urethral inflammation, from which the infection had extended along the prostate and the subperitoneal tissue, the patient dying of sepsis in about forty-eight hours before invasion of the peritoneum itself had occurred.

Dr. Hotchkiss objected to the case of Dr. McCosh being classified as one of pure gonorrhœal peritonitis, since the microscope had shown it to be a case rather of septic peritonitis.

DR. ABBE thought the question suggested by Dr. Hotchkiss's remarks a very pertinent one,—viz., whether the peritonitis in the cases referred to was gonorrhœal or septic. It seemed that in the female peritonitis of this character occurred very often, much oftener than in the male, but it was also likely to be of different type, characterized by rapid formation of plastic lymph, which acted as a barrier against further extension, and made the case one of local peritonitis, thus differing from the inflammation in the cases quoted, which seemed more like ordinary septic peritonitis. It was an interesting

fact that in the acute arthritis or synovitis of gonorrhœa careful search revealed gonococci in the fluid the first few days, but after a week they could not be discovered, having been destroyed by the inflammatory phagocytes in the fluid. In the author's case he thought the weight of argument was in favor of a mixed infection rather than one of pure gonococcus.

DR. McCOSH rejoined, the case was certainly one of septic peritonitis, since streptococci and staphylococci were found. Failure to find gonococci at this stage might not be of much value, so that the question whether the case was one of mixed infection or one of gonorrhœal infection could not be decided. The question whether gonococci were capable of exciting septic peritonitis had not been fully settled. The evidence had been mainly negative. He believed the majority of pathologists were of opinion that the gonococcus could not excite peritonitis, but until that question was definitely decided he thought it would be hard to arrive at a just conclusion as to the source of the infection in cases of peritonitis complicating a specific urethritis. In his own case he thought death could be regarded as a result of the urethritis, and the chances were that the urethritis had been a specific one.

GASTROSTOMY BY WITZEL'S METHOD FOR CARCINOMA OF OESOPHAGUS.

DR. F. W. MURRAY related the case of a man, sixty years of age, who was admitted to the New York Hospital in September, 1894.

Nine months previous he had first noticed difficulty in swallowing. This increased steadily until three months ago, when he could only take liquid food. For four months he had had pain in the throat when lying down, and one week ago he brought up blood for the first time. He had lost forty-five pounds since last May, and when admitted was anæmic, thin, and poorly nourished. He could swallow but a tablespoonful of fluid at a time; was troubled considerably with regurgitation, and, at times, had attacks of coughing attended with pain. He was constantly hungry, and complained of his inability to swallow solid food. Tongue coated, breath very offensive. Moderate amount of emphysema and chronic bronchitis. Arteries rigid, marked cardiac hypertrophy. Urine contained albumen and few granular casts. An attempt to examine the œsophagus with bougies failed, as all instruments were arrested at a point six and a

half inches from the incisors. With the mirror a growth could be detected at the beginning of the œsophagus, and on introducing the finger into the pharynx a mass could be felt. It was evidently a carcinoma affecting the upper end of the œsophagus. During the following ten weeks three attempts were made to pass bougies beyond the obstruction, but always with no success. The dysphagia gradually grew worse and at times was complete, so that feeding per rectum was resorted to.

September 29 gastrostomy was performed by the Witzel method. The stomach was easily drawn into the wound, and the operation presented no difficulties whatever. The patient reacted well, and on the next day feeding was commenced through the tube. For the first two days nourishment was given by the tube and the rectum alternately every three hours. From the third day on he was fed solely through the tube, and digested his food easily. Nourishment consisted of peptonized milk, soups, raw eggs, and whiskey. The wound healed by primary union, and the stitches were removed on October 6. There was no leakage whatever, no eczema of the skin, and the dressing above the tube was always dry. He gained strength steadily, soon lost the sense of hunger, and was discharged, October 26, in good condition. Since he has left the hospital he has continued to gain, and at times he is able to swallow small amounts of finely-minced meat.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 1, 1894.

The President, DR. WILLIAM HUNT, in the Chair.

THE SURGICAL TREATMENT OF GENERAL PERITONITIS DUE TO THE DISSEMINATION OF SEPTIC PRODUCTS.

DR. OSCAR H. ALLIS presented a paper on the above subject. He called attention to the analogy between a local peritonitis due to septic products and the condition present in a purulent pleurisy, saying that in both a serous membrane is involved; in both the abscess cavity is walled off with a pseudo-membrane; in both the recovery is chronic, and can only take place by the slow removal of the exudate and its replacement with healthy granulations, and in both drainage, free and unobstructed, is an uncompromising essential. The success of the operation for the relief of local purulent appendicitis depends not on washing out the cavity with antiseptic lotions, but in preserving in its integrity the wall of lymph that has been formed to limit the progress of the disease, and to prevent septic material from infecting the general peritoneal cavity. Still further, in a general peritonitis there exist not one but scores of pockets of poisonous matter—pockets everywhere—with lymph covering every tissue of the abdomen. To remedy this the surgeon enters with his hand, and carries a clean, warm fluid into every part of the cavity. He breaks open a great number of pus-chambers, and removes the ptomaines and leucomaines that are doing their deadly work. So far very well; but this to be effectual must be repeated. The washing does not purify the exudate,—more effete products will be cast off and must be gotten rid of. Some means must be taken to prevent adhesions taking place, while at the same time the elements of putrefaction and necrotic waste must be removed. Whether drainage-

tubes passed to the most dependent parts of the cavity, as a means of continuous flushing, would prevent reattachments can be learned only by trial. Such a course will be of no real value if partial or trifling. The waste must be driven off, and the stream kept up constantly night and day until the normal surfaces have regained their tone and thrown off the exudate. Under a continuous system of flushing or irrigation the waste products would be made to float constantly to the surface, and be more effectually carried off than by dependent dorsal drainage.

Such a course may commend itself to some surgeons, and as it has already been recommended in whole or in part, it will no doubt ere long receive a fair, intelligent trial.

Dr. Allis, however, could conceive of no adequate provisions for drainage except a long median incision—kept open by proper packing—with the patient prone except at the time of dressing. To prevent the sides of the incision from closing, or the intestines from uniting to the lips of the incision, rubber dam thoroughly covered with cerate could be tucked between the abdominal wall and the intestines on each side, with one border emerging from the incision. At the same time, to retard if not prevent adhesions of the contiguous coils of intestines, the whole serous surface could be well covered with a lubricant like cosmoline or cerate. If the abdomen has been previously flushed with water, the cavity should be dried before the application of the cerate. Were it not that adhesions tend constantly to form, he would be sanguine that the prone position alone, maintained constantly for weeks, would result in recovery. To guard against these, it would seem wise to re-enter the cavity on the following day, and reapplying cerate to the walls of the cavity and the entire surfaces of its contents, redressing with rubber dam as before, again place the patient prone. With dependent drainage, with an ample wound kept patulous, all water save such as is necessary to preserve outward cleanliness could be dispensed with. A difficulty might be experienced in keeping the patient in the prone position. This could be accomplished by means of thin, well-padded strips of wood, two or three feet long, strapped transversely to the pelvis.

Stated Meeting, November 5, 1894.

The President, DR. WILLIAM HUNT, in the Chair.

LIGATURE OF THE SPERMATIC CORD IN THE TREATMENT OF HYPERTROPHY OF THE PROSTATE GLAND.

DR. J. EWING MEARS, after some remarks upon the anatomy and physiology of the male generative apparatus, and upon the etiology of prostatic hypertrophy, said that ligature of the spermatic cord appeared to him to be both philosophic and physiologic as a treatment for such hypertrophy. Without doubt castration, as suggested by Dr. J. William White, would prove effectual in the production of atrophy, and reports of cases have appeared in recent current surgical literature in which very positive relief was afforded by the operation. It is an operation, however, to which patients will naturally refuse to submit unless in the very last stages of disease of the bladder resulting from prostatic obstruction.

During the last year he had examined patients on whom he had performed subcutaneous ligature of the vessels of the cord for varicocele, and in all of them he had observed more or less atrophy of the testes, although the vas deferens was not included in the ligature. He believed that if the vas deferens should be included in the ligature applied to the vessels of the spermatic cord, it would produce atrophy of the testes, and, since the shrinking of the testicles would be gradual, would not disturb the mental condition of a patient so much as the operative removal of those glands would.

LITHOTOMY AFTER PARTIALLY SUCCESSFUL CLOSURE OF EXSTROPHY OF THE BLADDER; SUBSEQUENT CONSTRUCTION OF A PERINEAL URETHRA FROM SCROTAL TISSUE.

DR. JOHN B. ROBERTS reported a case of exstrophy of the bladder in a child eight years of age. In this case, as the result of an operation some years earlier, the posterior wall of the bladder did not protrude, but formed a shallow cup at the base of a rudimentary

penis. The urine ran from the bladder over the penis and scrotum, and also escaped from linear sinuses along the top and sides of the thickened tissue which closed the upper portion of the cleft in the bladder.

As a first step in an operation for the relief of this condition he endeavored to produce a perineal fistula by thrusting a curved needle from the base of the bladder through the perineum, behind the scrotum, and conducting a drain through the opening so made. The tube was increased in size at various intervals until at the end of two months there was a canal which would contain a rubber urethral bougie of moderate size.

He then etherized the patient a second time, and made a circular denudation around the edge of the open bladder. The rudimentary penis, consisting of the spongy body, the cleft glans, and cleft prepuce, was entirely removed. Cylindrical masses on each side of the opening in the bladder, which appeared to be the representatives of the cavernous bodies, were also dissected away. A piece of soft rubber catheter was then introduced through the perineal opening established by the first operation, and its end allowed to reach the floor of the bladder. The purpose of this procedure was to secure downward drainage of the urine after the edges of the bladder were brought together.

Seven deep sutures were next inserted in a manner to bring the denuded edges of the bladder-wall into apposition in a vertical direction. The wound was then sealed with iodoform and collodion.

The perineal tube, however, soon became blocked with mucus and pus, which was continually flowing from the irritated mucous membrane of the bladder, and was not satisfactory as a drain. He finally passed a drainage-tube from one of the upper sinuses directly through the bladder and out of the perineal opening, in order to prevent the sutures in the middle line from yielding. These middle sutures, however, finally gave way, and when the patient passed from observation there was a large opening in the middle of the attempted closure. Some union had, however, been obtained. The perineal opening showed a marked tendency to close.

He did not see the patient again until October, 1894, sixteen months later. At this time the perineal opening had entirely closed, and its scar was inconspicuous, but the exstrophy of the bladder was completely covered by the new anterior wall. At about the middle of this wall, which had been constructed in the manner described,

was a small opening of sufficient size to admit the end of a large probe. At the upper and right-hand side of the portion of the wall which had been constructed in infancy was a linear sinus about an inch in length, which allowed the urine to escape. There was a little oozing of urine from the small central fistula, but the major portion escaped from the sinus at the upper right-hand border.

The child's general condition was then poor, the urine was offensive, and a sound detected the presence of calculi in the bladder. By enlarging the opening in the middle of the bladder-wall in front; ten calculi, varying from five-sixteenths to five-eighths of an inch in diameter, were removed. Their combined weight while moist was 195 grains.

It seemed to him that the establishment of a perineal urethra lined with skin would afford efficient drainage to the new bladder, and would remain patulous. He therefore determined to cut a channel between the perineum and the floor of the bladder, and turn in flaps of skin taken from the scrotum. As a first step he incised the scrotum in the middle line and removed both testicles. He then made a puncture downward from the base of the bladder to this scrotal incision. This permitted him to utilize the scrotal tissue for lining the new channel. By two horizontal incisions on each side of the opening he obtained strips of scrotal skin and superficial fascia half an inch wide and an inch and a half long. To the inner end of these ligatures were fastened and the threads carried upward through the new urethra. The cutaneous flaps were then drawn up along the canal into the bladder, and were then sutured on each side of the incision in the middle line of the anterior bladder wall. This manœuvre lined both sides of the perineal opening with skin from the perineum to the anterior bladder wall. A drainage-tube was inserted to keep the channel patulous, and the bladder and tube were washed out.

No attempt was made to close the opening in the middle line or that at the upper and right-hand side. He deemed it better to leave these open for convenience in flushing the foul bladder cavity. It was his intention to close these at a later period. The edges of the wound in the perineum left by the plastic operation were brought together with sutures, and healed promptly. Antiseptic solutions were used for washing out the bladder and tube, and the patient did well for several days. His temperature was not high, and the drainage through the perineal tubes was quite satisfactory, though not always

perfect. At the end of three or four days he began to lose his appetite and vomited occasionally. He died on the fifth day, apparently from exhaustion.

An autopsy showed disease of the left kidney, which was riddled with small abscesses. The ureter on this side was double, and showed great enlargement of the calibre and thickening of the walls. The pelvis of the kidney and the double ureter were filled with pus. Just before the two ureters of this kidney reached the bladder they united and opened into the bladder by a single orifice. The right kidney and ureter appeared to be normal.

SECRETION OF URINE AFTER ABDOMINAL SECTION.

DR. CHARLES B. PENROSE presented the statistics from 111 cases in which he had opened the abdominal cavity for various causes, giving the amount of urine passed in each case during the first three days after operation. In all of the cases the kidneys seemed to be functionally normal before the operation.

The patient was generally operated on at 11 A.M. The last meal was given the night before. A small amount of water was given in case of thirst on the morning of the operation. Small increasing quantities of hot water were given first twenty-four hours after the operation; and food was first administered forty-eight hours after the operation. The women were also thoroughly purged with saline purgatives during the twenty-four hours preceding the operation.

The minimum amount of urine passed during the first twenty-four hours was four ounces. This was in a case of unilateral oöphorectomy. The maximum amount was twenty-two ounces, being in a case of ventral hernia. The average amount for all the cases was for first twenty-four hours, 13.4; for second twenty-four hours, 14.6; and third twenty-four hours, 19.6.

The patients all recovered easily, never showed any symptoms of ureteral obstruction, or of any renal disturbance.

DR. JOHN B. DEEVER remarked that if these same observations had been made with reference to other surgical operations the result would probably be the same. He believed that they were largely due to the anæsthetic. He was prejudiced against ether in protracted operations on account of its effect upon the kidneys. He had seen congestion of the kidney with blood in the urine time and time again immediately following operations where ether had been the anæsthetic used.

DR. JOSEPH HEARN thought that in prolonged operations of any kind there is more or less diminution in the amount of urine secreted during the first forty-eight hours. He attributed it to the lessened vitality of the patient. During the operation the pulse becomes feeble, and there is diminished supply of blood to the kidney and a lessened secretion of urine.

DR. ORVILLE HORWITZ said that in the last thirty-five or forty operations for stricture in the membranous portion of the urethra he had had the amount of urine passed noted; the result is similar to that reported by Dr. Penrose. In some cases the quantity in twenty-four hours has been as low as six or eight ounces.

DR. JOHN B. ROBERTS remarked upon the practice of keeping patients after abdominal operations from drinking water. It seemed to him that gynecologists, and perhaps surgeons, had run to the extreme on the theoretical assumption that water by the mouth encourages suppuration in the belly after an imperfectly aseptic operation. It seemed to him that the practice of keeping the patient twenty-four or more hours without water bordered closely on cruel surgery. In his abdominal cases he always permitted the reasonable use of water, and had never had occasion to regret it. He did not see why they should not be given water, both because they like it and as a therapeutic measure, particularly if the kidneys have a tendency to be inactive. It is needed to fill up the depleted vessels after the bleeding of operation. The use of water does more good in favoring the action of the kidneys than it does harm in interfering with the wound.

DR. RICHARD H. HARTE said that the thirst after operation is one of the most unfortunate things connected with abdominal operations. It would be unwise to give the patient all the water that he would drink, for, in the majority of cases, he would take more than was good for him, and in a short time the stomach would become so irritable as to reject everything. Four to six ounces of water thrown into the rectum will relieve thirst as readily as if given by the mouth.

DR. ROBERTS did not mean it to be understood that as soon as the patient comes out of the ether he allowed large quantities of water. He did not at first give them all that they would drink, but did not restrict it much. A moderate amount of water, say three or four ounces, at intervals, does no harm. He condemned the practice that keeps the patient without water for twenty-four or forty-eight hours. If the operation has been a bloody one, water is required to fill up the vessels. It is not only after an abdominal operation that

the patient is thirsty, but the same occurs after any operation. He had used the rectum, and that is a good way. He claimed that the tissues need water, and that the patients are no worse, and are more comfortable, if permitted the use of water. Practically, he did not see that abdominal operations were different from other operations in their general management. Aseptic wounds, common-sense treatment, and comparative freedom from opium is a good line to follow in all surgery.

DR. THOMAS S. K. MORTON spoke in favor of giving water after abdominal section. Two years before he began to give water freely by the mouth as well as by the rectum, which latter he had been doing for some time. Six ounces of water, with or without a little brandy or fluid extract of valerian, by the rectum every three hours, is usually promptly absorbed. As soon as the ether-vomiting subsides he begins by giving one ounce of water by the mouth every hour. If this is well borne and the thirst is urgent, the interval may be shortened half an hour or to fifteen minutes. Since adopting this plan patients had been far happier than under the old method, and he had no reason to regret it. After twenty-four hours the patient, as a rule, has as much water as is desired.

DR. PENROSE did not intend to claim that there was anything in the small amount of urine passed peculiar to this operation of abdominal section. He thought that under the same conditions of shock, prolonged anæsthesia, starvation, restraint from drink, and preparation by watery purgatives, the amount of urine would be the same in other operations.

With regard to the use of water after abdominal section he had not found that the patients suffer so much as some of the gentlemen have mentioned. He thought that coeliotomy did not cause greater thirst than did other operations. The only reasons that he knew of for restricting the quantity of fluid were to prevent vomiting, and thus favor quietude of the abdominal incision, and, second, because under this plan the peritoneum perhaps absorbed more rapidly whatever may be in it or thrown out from the peritoneal surface after operation. Of course, this thirst does not prevent the patient from developing septic inflammation if the operation has been a dirty one. If there is any likelihood that any dirt has been left, it is desirable that the fluid should be absorbed as quickly as possible, and he thought that the peritoneum absorbed more rapidly if the tissues were hungry for water.

EDITORIAL ARTICLES.

THE AMBULANT TREATMENT OF FRACTURES OF THE LOWER EXTREMITY.

I. J. P. WARBASSE: "The Ambulant Treatment of Fractures of the Tibia and Fibula."—*Transactions of the Brooklyn Surgical Society*, October, 1894; *Brooklyn Medical Journal*, 1895.

II. A. VON BARDELEBEN: "Über die frühzeitige Bewegung gebrochener Glieder, mit besonderer Rücksicht auf die untere Extremität."—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

III. KORSCH: "Demonstration von Fällen, die wegen Ober- und Unterschenkelbrüchen und complicirten Bruchsen seiner Zeit mit ambulatorischen Gipsverbänden behandelt worden sind."—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. ALBERS: "Über Gehverbände bei Brüchen der unteren Gliedmassen."—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

V. KRAUSE: "Albers, Über Gehverbände bei Brüchen der unteren Gliedmassen."—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

I. WARBASSE extols the plaster bandage in the treatment of fractures of the extremities. The use of the box, the inclined plane, and the many mechanical contrivances employed in the treatment of fractures of the leg may be said to have become almost entirely superseded by the plaster bandage, at least in the hands of those who have to treat any considerable number of fractures. Though no dogmatic statement should be made to the effect that plaster is indicated in all such fractures, for conditions may exist which call for one of the other

modes of treatment ; still it may be stated that the plaster bandage is applicable to by far the greater number of such injuries, and this number may be said to include not only the simple fractures, but also those of a compound and complicated character. Untoward results occur only in the hands of those unskilled in its use. With the introduction of the plaster bandage into surgical practice there came to the patient with a broken leg the priceless boon of being able to be up and about on crutches, instead of sitting or lying through the weary period of a month or more anchored to some mechanical contrivance, and in this very feature lies one of the great advantages of the plaster dressing.

The purpose of this paper is to deal with certain modifications of the plaster splint, by means of which the patient who has sustained a fracture of the leg may not only be up and about, but may be enabled to walk unaided on both legs without pain, and without interfering with the consolidation of the broken bones.

F. Krause published a paper in 1891 upon the treatment of fractures of the bones of the leg in walking patients.¹ Some two years later Korsch appeared with a paper upon the same subject, including also fractures of the thigh and compound fractures.² An objection to his method was that he applied a plaster bandage immediately in contact with the skin. Notwithstanding the very great care employed decubitus occurred in two of his cases. The bandage was made to extend part way up the thigh, fixing the leg in a position of slight flexion. At about this same time Bruns, of Tübingen, published his article on the ambulant treatment of fractures of the leg and thigh, his invention consisting of a splint made of metallic rods and leather straps, by means of which the whole leg was suspended, the weight of the body being borne largely by the tuber ischii and perineum.

¹ F. Krause: Beiträge zur Behandlung der Knochenbrüche der unteren Gliedmassen in Umhergehen,—*Deutsche medicinische Wochenschrift*, 1891, No. 13.

² Korsch: Über den ambulatorischen Verband bei Knochenbrüchen des Unter- und Oberschenkels, so wie bei complicirten Brüchen,—*Berliner klinische Wochenschrift*, 1893, No. 2.

In cases of fracture of the tibia or fibula, the thigh muscles as well as the leg muscles suffered from the atrophy of disease,—a condition which is not brought about when the simple plaster cast is used.¹

In the latter part of the year 1893, Dollinger, of Budapesth, appeared with a description of a removable splint for the ambulant treatment of fractures of the bones of the leg, reporting three cases upon which he had employed his method.²

The idea of the method employed by Warbasse was obtained, he states, from Dollinger's paper. He has practised it, since the latter part of the year 1893, upon six cases in the service of Dr. L. S. Pilcher in the Methodist Episcopal Hospital in Brooklyn. The method, as he practises it, consists, first, in the reduction of the fracture, and cleansing of the skin of the leg with soap and water. Then with the foot fixed at a right angle to the leg, a flannel bandage is smoothly and evenly applied from the toes to just above the knee. This bandage is made to include beneath the sole of the foot a padding of ten or fifteen layers of cotton wadding, making a pad about three-fourths of an inch thick, when it is compressed by the moderate pressure of the flannel bandage. Over this is now applied the plaster bandage from the base of the toes to just above the knee, especial care being taken that the application is made smoothly and somewhat more firmly than is the custom in the ordinary plaster cast. The layers of the bandage should be well rubbed as it is applied, with the view of obtaining the greatest amount of firmness with the smallest amount of material. The sole is strengthened by incorporating in with the circular turns an extra thickness composed of ten or twelve layers of bandage well rubbed in together, and extending longitudinally along the sole. The bandage is applied especially firmly about the enlarged upper end of the tibia, and here it is made somewhat

¹ P. Bruns: Über den Gehverband bei Fracturen und Operationen an den unteren Extremitäten, nebst Beschreibung einer neuen Geh- und Lagerungsschiene,—Beiträge zur klinische Chirurgie, x Band, 2 Heft, 1893.

² Dollinger: Eine einfacher abnehmbarer Gipsverband zur ambulanten Behandlung der Unterschenkelfracturen,—Centralblatt für Chirurgie, No. 46, 1893.

thicker. As it dries it may be pressed in so as to conform more closely to the leg just below the heads of the tibia and fibula. The assistant, who stands at the foot of the table and supports the leg, makes such traction or pressure as is required to keep the fragments in proper position, while the plaster is being applied. The operation requires about twenty minutes, and by the time the last bandage is applied the cast should be fairly hard.

It is seen that when this cast has become hardened the leg is suspended. When the patient steps upon the sole of the plaster cast, the thickness of the cotton beneath the foot separates the sole of the foot so far from the sole of the cast that the foot hangs suspended in its plaster shoe. Thus the weight of the body which would come upon the foot is borne by the diverging surfaces of the leg above the ankle. The chief of these is the strong head of the tibia. A lesser rôle is played by the head of the fibula, and the tapering calf in muscular subjects.

The immediate application of such a splint prevents subsequent swelling, because the swelling which follows a fracture is largely due to the movements of the ends of the fragments; and the sooner the thorough immobilization is effected, the less will be the swelling. Examples of this fact are seen in the fractures of the skull and pelvis.

The bandage in one case was not carried beyond the head of the tibia, thus allowing the use of the knee. The upper end of the cast seemed to interfere with the flexion of the joint. It is the opinion of the author that such a dressing can be applied and allow of a perfect freedom of the joint, and he intends in the future to employ the shorter cast in cases of fracture below the middle third of the leg. The use of a snug-fitting long stocking is also suggested in the place of the flannel bandage.

The cases reported are briefly as follow :

CASE I.—Housewife, aged twenty-six. Fracture of fibula just above malleolus. Cast was applied on the day following the accident, but was not extended above the knee. On the following day she was

able to walk about the ward. This case was not followed up to its termination.

CASE II.—Driver, aged twenty-one. Fracture of tibia in middle of middle third. Cast was applied on the day following the injury. On the following day the patient walked about with comfort, and was discharged from the hospital. He returned weekly for observation, walking with a cane. At the end of six weeks the splint was removed, and firm consolidation was found.

CASE III.—Butcher boy, aged fourteen. Fracture of fibula just above malleolus. The cast was applied on the day following the accident. On the next day the patient was able to walk with perfect comfort, and two days later he was discharged. During the following five weeks he walked to the hospital for repeated observations, and at the end of that time the cast was removed, and firm union found to have taken place.

CASE IV.—Teamster, aged twenty-nine. Fracture of fibula two inches above its lower extremity, and fracture of the tip of the malleolus of the tibia. There was considerable swelling about the ankle, and an abrasion of the skin on the inner side of the leg. Seven days after the injury the swelling had quite subsided, though the abrasion was not entirely healed. At that time a walking cast was applied. On account of the swelling the patient was not able to walk very well, though he could bear his weight on the injured limb. He was discharged on the following day, and has secured a good result.

CASE V.—Peddler, aged eighteen. Fracture of both tibia and fibula a little above the middle of the leg. Two days after the injury the walking cast was applied. On the following day he walked about the ward almost as though the leg were sound. It was such a pleasure to see a patient with a fracture of the upper part of both bones of the leg walking about unaided on the third day after the accident that he was retained in the hospital four days longer. After his discharge he returned for subsequent observations till the cast was removed at the end of the sixth week. The result was so perfect that four months after the injury there was scarcely any sign of the previous existence of a fracture.

CASE VI.—Laborer, aged twenty-four. Fracture of fibula two inches above malleolus. The cast was applied on the third day after the accident. This patient was able to walk satisfactorily. He returned for subsequent observations, and on the fifth week the cast was removed and good union found, though some slight swelling persisted about the seat of the fracture for several weeks.

The results in these cases were as invariably good as those which had been put up in the simple plaster cast; and, certainly, if for any reason the patients did not care to walk, they could lie about as though they had on the ordinary cast. It is the author's opinion that by a little experience one can practise this method of treatment with great success and with eminent satisfaction to the patient. In the case of business men or those whose occupations do not put much strain upon the legs, a fracture of the leg need not ordinarily cost a man more than two days' detention from business.

Aside from the purely business aspect of the question, Bardeleben has called attention to the fact that with the walking cast the dangers of decubitus are lessened, the muscles do not atrophy, and consolidation takes place more quickly than when continuous quiet is enforced. The general condition, the appetite, digestion, and sleep are more natural than when the patient is kept quiet. This is of especial importance in old people in whom the dangers of hypostatic pneumonia are so great. The drinking man stands a much better chance of escaping delirium tremens if he can take daily exercise. This complication occurs so commonly in cases of fracture treated by the old method that Bardeleben does not regard it as a mere matter of chance that not a single case of delirium has developed among the large number of drinking men treated with the "walking cast" at his clinic.

Dollinger renders such a cast removable by strengthening the posterior segment by means of six or eight extra thicknesses of narrow bandage placed longitudinally and included in the grasp of the circular turns. As soon as the bandage has become hard, but is still damp, this posterior segment is cut out by two longitudinal cuts down the

postero-lateral aspect of the leg. Four leather straps with buckles are applied around the leg to hold the two parts of the cast together. This allows of the removal of the cast for the purpose of massage or the treatment of compound fracture.

Albers has made a much lighter splint by using only an under-dressing of plaster and covering this with strips of wood, shavings, and crinoline held together with glue.

The author expresses his belief in the entire feasibility and great value of the *gehverband* as a conclusion of his experience with its use.

II. BARDELEBEN has treated 8000 fractures during the past 50 years, 4058 of these have occurred during the last 17 years, and are recorded in the annals of the *Charité*. During the past two years 116 fractures of the lower extremities have been treated in walking splints. Of these 89 were fractures of the leg (12 complicated), 5 were fractures of the patella, and 22 were fractures of the thigh, of which 5 were compound. These include three cases of osteotomy for genu valgum.

The advantages of the early mobilization of fractured limbs, especially the walking about with broken legs, have hitherto been taken advantage of but little. Bardeleben recalls how that over thirty years ago he sustained a fracture of the malleolus and dislocation of the foot, and walked about on the first day, and never allowed the accident to confine him for any length of time. The advantages of such early motion are self-evident, especially from the stand-point of the patient. The patients themselves have to appreciate the advantages of this new method. None had to have the "*gehverband*" applied against his will.

In regard to the dangers of the walking splint Bardeleben does not regard the method as a "lazy makeshift," as Stromeyer has called the plaster cast. It requires careful watching. It is safer to wait till the third or fourth day before applying the cast. If the swelling is considerable when the cast is applied it will usually be necessary to remove it in a few days, not because of any increase in the swelling, but because under the quiet which the splint has insured the

swelling has become so diminished that the cast is entirely too large. It is desirable during the whole period of treatment, at least with plaster splints, that the dressing should fit exactly to the limb. This is, of course, especially necessary where extension is desired, as in fractures of the upper end of the femur. Here it is important that about all of the bony prominences the bandage shall fit snugly. During the entire period of treatment the surgeon has, on one hand, the complaint of the patient as to local pressure and, on the other, the appearance of the toes to keep him informed of the condition of the limb; though he had better cut off the bandage ten times too often than once too seldom.

The treatment of open fractures by the "gehverband" requires especial caution. It is well known that the compound fractures, not only from olden times, have been regarded as the test of surgical capability, but also since the introduction of the antiseptic method they have had a high claim upon the care and skill of the physician. Certainly, by the use of the walking splint the care for the aseptic condition of the wound cannot be for a moment relaxed. When these precautions are taken there is no especial danger in the ambulant treatment of compound fractures. Bardeleben's experience involves sixteen cases, including three osteotomies of the femur. Twelve of the cases were compound fractures of the leg. Of course, there are open fractures in which amputation would be sooner thought of than the walking splint. But the majority are such that, when the first few days have demonstrated that wound infection is not going to occur, the "gehverband" can be applied.

Bardeleben lays down the following law: It is of the greatest advantage to the patients that such a dressing can be applied to a broken leg that he can bear the weight of the body upon it and walk about; but such a method of treatment should be applied only under medical supervision and with the most careful consideration of complications which might arise.

III. KORSCH preceded his demonstration of cases before the Surgical Congress with an historic sketch of the development of the

walking cast. The originator of the idea was Seutin, though his dressing did not permit the patient to walk upon the broken leg.

Hessing was the first really to accomplish this practical application of a dressing in which the patient could stand upon the broken leg. His apparatus was, however, very expensive. F. Krause modified Hessing's principle in such a way that plaster of Paris could be used in fractures of the leg and in transverse fractures of the lower third of the thigh. Harbordt and Hentzner contrived apparatus for fractures of the thigh, in which extension was accomplished by an arrangement for drawing the foot down against a foot-board. Contra-extension was accomplished by a pad resting against the tuber ischii.

The author shows that passive extension, which is effected by the application of the plaster directly next to the skin of the malleoli, the dorsum pedis, and the heel, will suffice for the extension in a thigh fracture when it has firmly attached to it a semicircular seating which presses against the tuber and thus accomplishes contra-extension. He first employed splints after the character of the splint of Taylor, and enveloped them in a plaster casing, leaving the knee-joint and ankle free. This was followed by the method consisting in applying a plaster cast as far up as the tuber ischii and incorporating into the same a Thomas splint made of heavy wire, the portion which pressed against the tuber being bolstered with cotton and bandage. Albers dispensed with the metallic splint, and depended upon the plaster for contra-extension. Bruns, H. Schmid, Aust, Dollinger, and Liermann have worked in the same direction.

Korsch presented but seven of his cases. Of these, three involved the thigh and four the leg. Good results were obtained in all cases.

IV. ALBERS has adopted the treatment of fractures of the leg by means of the "gehverband," which Korsch has been carrying on in Bardeleben's clinic. The splint is made with plaster bandages and a leather strip. Rarely were metallic strips and adhesive plaster employed. The plaster bandages have as a basis strips of mull with-

out a selva edge four to six metres long and twelve centimetres wide. These are spread out on a board, and a mass of finely-powdered modelling plaster rubbed over them. The bandages are then loosely rolled up. Before using they are plunged into hot water. They should harden in ten minutes. The leather strip, which is one metre long, one and a half centimetres broad, and two millimetres thick, is passed through hot water and laid between the outer layers of the plaster. Such a strip is inserted in front, behind, and at either side of the limb. The posterior strip passes over the heel and is continued under the foot; the anterior strip is continued down over the dorsum pedis, and the lateral ones are continued around over the others. The plaster bandage is applied directly upon the skin, which should be slightly oiled. In the application of the plaster bandage no reverses should be made, but when the direction of the bandage would be changed it should be cut, so that it shall lie perfectly smoothly. Each layer should be well rubbed. The dressing should be applied in bed. When a pelvic support is necessary the proper elevation can be secured by the use of pillows. An anæsthetization is more harmful than useful, for under narcosis the limb has a different configuration. When the muscular relaxation disappears after the narcosis, the pressure will be increased. When great pain is present it is best to employ injections of morphine. The toes should be left exposed for the observation of the circulation. Elevation of the limb will often reduce swelling; when this does not suffice, the bandage must be removed. Severe local pain from pressure indicates the cutting of a fenestrum, which should be tamponned and again covered with plaster. The first attempt at walking should be made on the day following the application of the cast. A crutch and a cane are used at first; later two canes are employed; and, finally, some patients walk without any support at all. Albers has observed seventy cases, to which may be added one case withdrawn from treatment, and seven additional cases. These seventy-eight cases were divided as follows:

Fifty-six fractures in the leg.

Five fractures of the patella (subcutaneous, transverse).

Sixteen fractures of the thigh.

One fracture of both leg and thigh.

In the fractures of the leg, the method of Korsch was employed with the modification that the application was done in two stages. The foot is fixed at a right angle and the knee extended. The slightest equino-position makes walking difficult. One assistant holds the thigh, another the foot. This second assistant also maintains the reduction of the fragments by traction, rotation, or whatever is required. By means of the two stages, the solution of the problem is made easier. First a plaster cast of five or six layers is applied. The assistant holding the foot need not be especially particular during its application. Five or six minutes after its application it is still so soft that any necessary corrections can be made. The operator now takes hold and directs and supplements the force applied by the assistant till the desired position is obtained. By traction and pressure the bandage is held in this position till hard, and thereby any recurrence of imperfect position is prevented. The bandage is then completed by the application of five or six more layers of plaster with the longitudinal strips, or with water-glass bandage. Very serviceable are wood shavings, cambric, and flannel bandages with joiner's glue. Before the latter can be applied the plaster must be thoroughly dried, —for at least twenty-four hours. The plaster is then painted over with the glue, and then a cambric bandage put on. This is then painted with glue, and the long wood shavings applied longitudinally, and held in place by another cambric bandage. This is again painted, and a flannel bandage put on over all and glued. The application of this glue dressing takes about fifteen minutes. It becomes dry in twelve hours, so that the patient can walk on it. The plaster and glue splint is very light and strong. It can be cut down so as to form a removable antero-posterior splint, and still give the necessary support.

Out of the fifty-six fractures of the leg thus treated were,—

Twenty-one malleolar fractures (both malleoli in fourteen cases).

Eight fractures in the lower third (both bones in seven cases ; one open fracture).

Fourteen fractures at the junction of the lower and middle thirds (in seven cases the line of fracture in the tibia was very oblique ; one open fracture).

Thirteen fractures of the middle and upper thirds (in six cases the line of fracture in the tibia was very oblique ; two open fractures).

When the swelling was not great the splint was put on on the first or second day ; but if the swelling persisted the leg was left on a Watson's splint for a day or two, and then if it did not disappear the cast was applied as usual.

In open fractures the soft parts, when possible, were sutured in layers, or the wound was packed with iodoform gauze. The open fractures were not put up till the end of the first week. Where delirium tremens has threatened, the splint has been applied on the fifth day, and thereby an attack averted.

In malleolar fractures and breaks of the lower third, a bandage extending from the heads of the metatarsal bones to the condyles of the tibia suffices ; in fractures of the junction of the lower and middle thirds, with a tendency to dislocation, the knee-joint had better be included ; and in fractures higher up, the cast should reach as far as the middle of the thigh.

The malleolar cases walked in the course of the first week usually without any support. So with the fractures in the lower third of the leg. The rest used canes or cane and crutch until the last week before the consolidation. These fifty-six patients were all able to walk eventually without trouble.

Consolidation in the malleolar fractures took place on an average in three weeks ; and in the fractures at the middle and lower thirds in from five to six weeks. In the remainder of cases consolidation took place in from three to fourteen weeks,—averaging eight weeks. In the treatment two or three casts were necessary. Considerable decubitus did not occur in any of the cases. A bandage

applied too soon had once to be removed. When the casts were taken off the ankle and knee-joints were found movable; and in no case was there any considerable muscular atrophy.

Patients with malleolar fractures and fractures of the lower third were, on an average, able to return to work in six weeks; those with fractures in the lower border of the middle third in nine weeks; and those with higher fractures after the thirteenth week.

In cases of fracture of the patella a plaster bandage is applied from the malleoli to within three inches of the tuber ischii. This cast has a big fenestrum over the knee, through which the patella appears. For the protection of the fracture a strip of iron band, running three or four centimetres in front of the knee, is incorporated in the plaster above and below. The fragments of the patella are drawn together with adhesive plaster. When there is not much fluid in the joint, the dressing is applied immediately. Otherwise, the fluid is drawn off by aspiration, and the limb treated on the Watson splint for a week. Five patients were thus treated by Albers, the separation representing one and a half to three and a half centimetres. From three to seven weeks were required in obtaining a firm union. All of the patients walked with this splint, and after its removal without support; and after a few weeks were able to bend the knee ninety degrees. The confinement in the hospital averaged fifty-two days.

Osteotomies after Ogston for genu valgum were treated on the day after the operation by the application of a plaster cast reaching from the malleoli to within three inches of the tuber ischii, with which the patient (two cases) was allowed to stand on the third day after the operation. Later this was replaced with a plaster and glue capsule, which was removed daily after the sixth week for massage and passive motion, and then replaced for walking.

The "walking splint" for fracture of the thigh reaches from the heads of the metatarsal bones to the tuber ischii, and is applied in four stages,—

(1) Plaster bandage from the metatarsal bones to the knee,

directly upon the skin ; five to six thicknesses ; foot at a right angle (ten minutes' pause).

(2) Placing the patient with pelvis elevated, extension to the plaster cast which is now hard applied by assistants ; contra-extension by bracing the well foot against the foot-board of the bed, and by a second assistant, who stands at the head of the bed and places his hands against the sides of the chest. The extension should be applied till the deformity is corrected and the legs of even length.

(3) Application of a plaster bandage cataplasma, eighty centimetres long, twenty centimetres broad, and eight layers thick. The upper end, which is doubled over, rests against the tuber ischii, the middle portion lies horizontally about the femur, and the lateral wing is turned upward about the gluteal folds and forward in the region of the anterior superior spine, covering the end of the middle portion, and ascending diagonally to the umbilical region, where it is held by the hand of an assistant.

(4) Uniting the first applied plaster cast and the cataplasma by four plaster bandages, in the upper layers of which four leather strips are incorporated. These bandages must thoroughly include the lower original cast.

The bandaged limb is now placed on pillows. The first attempt at walking is made on the following day.

The application consumes about thirty minutes, and the whole splint weighs about two kilogrammes.

Up to the present time fifteen patients have been treated by this means by Albers. In five cases the bandage was applied on the day of the accident. These were one fracture just below the lesser trochanter, one in the middle, and two at the junction of the middle and lower thirds, one being a compound fracture. In seven cases the splint was applied from the second to the fifth day. Of these was one fracture of the neck, one at the junction of the middle and upper thirds, one in the middle, and four at the junction of the middle and lower thirds ; one being compound.

In two cases the treatment was not begun until the thirteenth and

fifty-ninth days. One phthisical man was tried with the splint from the twelfth till the twenty-third day, but because of decubitus on the perineum the treatment had to be discontinued.

In the cases treated early, consolidation took place in from four to five weeks. A compound fracture, which was converted into a subcutaneous fracture by suture, walked about after the eighth day, and on the twenty-seventh day was consolidated.

In three cases there was no shortening. In only one case was there a shortening of three centimetres; but this was the case of a Pirogoff stump and an oblique fracture at the junction of the middle and lower thirds.

The patients thus treated were able after the first week to walk safely with crutch and cane. Many laid the crutch aside, and some were able finally to walk without any support. Most of the patients after the second week were able to go up and down stairs without assistance.

After the removal of the cast the foot joints were always free. The knee, which at first was somewhat stiff, after a few weeks became perfectly limber.

Atrophy of the quadriceps in most cases was absent entirely, and was only pronounced in compound fractures because of the tearing of the muscle by the end of the upper fragment.

Most of the patients remained for after-treatment till after the third month. One case, an oblique fracture at the junction of the middle and lower thirds of the femur, was able to go to work after the sixth week.

Albers presented before the German Surgical Congress a patient who ten days before had been run over and sustained a compound fracture of the left leg and left thigh. On the fourth day a "gehverband" was applied, and he walked with the aid of a crutch and cane.

V. KRAUSE, in the discussion on the use of the "gehverband" before the last German Surgical Congress, said that he had used the method for seven years. He has worked for three and a half semes-

ters in Altona, and has treated in the ambulant splint the following fractures: Twenty-three fractures of both malleoli, thirteen fractures of the outer malleolus (some with rupture of the internal lateral ligament, and some with the tearing off of the tip of the inner malleolus) with one compound fracture; thirty-six fractures of the leg, of which three were compound, and one was a double fracture of both bones, making in all a total of seventy-two cases of fractures of the bones of the leg. There were also three transverse fractures of the patella, and one compression fracture of the talus.

To this list may be added the following osteotomies and resections which were treated by the same method: one osteotomy for aggravated flat foot; two osteotomies for faulty union in malleolar fractures; eight osteotomies of the femur for genu valgum, once on both sides; one wedge resection for angular ankylosis in the knee; four knee resections for tuberculosis; six ankle resections for tuberculosis; making in all twenty-two operated cases.

The sum of all of the fractures, osteotomies, and resections treated in the "gehverband" is ninety-eight.

He regards it as very important to decide whether quicker consolidation takes place by the ambulant treatment than by the old methods. He presents the following table from Paul Bruns,¹ with which he gives his own results:

AVERAGE PERIOD OF HEALING IN DAYS.

FRACTURES.	TILL CONSOLIDATION.				TILL DISCHARGED FROM HOSPITAL.		
	Gurlt.	Moritz.	Leisrink.	Krause. Gehverband.	Leisrink.	Weber.	Krause. Gehverband.
(1) Leg	56	47	. . .	. . . .	. . .	53	. . . .
(a) Upper and middle third . . . . .	. . .	. . .	70½	41.6	106	. .	60.2
(b) Lower third . . . . .	. . .	. . .	47½	38.75	80	. .	57.33
(c) Both malleoli . . . . .	. . .	. . .	. . .	35.4	. . .	. .	51.
(2) Fibula	42	36	30¾	. . . .	44¼	49	. . . .
Outer malleolus . . . . .	. . .	. . .	. . .	31.3	. . .	. .	47.
(3) Tibia	49	42	51	. . . .	63¼	36	. . . .

¹ Lehre von den Knochenbrüchen, pp. 268 and 269.

From this table it will be seen that there is much difference in the time of healing in fractures of the fibula. Fractures of both malleoli seem also to heal as quickly under the old methods of treatment as under the new. The fractures of the lower third of the leg heal but slightly quicker in the "gehverband" ($38\frac{3}{4} : 47\frac{1}{2}$); but much more pronounced is the difference in the periods at which the patient is able to go to work without the splint ($57\frac{1}{3} : 80$). In the treatment of fractures of the middle and upper thirds of the leg the ambulant method shows a great advantage in the period of consolidation as well as in the time when the patient can return to work. It seems that the higher up the fracture is the sooner a cure is effected by the ambulant method of treatment.

To these statistics may be added the following comments:

The data concerning the period of consolidation can be only relative, for the reason that the cast is not taken off every day for observation of the condition of the fracture. The same is true of the old method. So in no case is the number too small, but more often too high. In order to determine more closely the number of days required for consolidation, Krause made a test case of a laborer, sixty-two years old, whose leg was fractured between the middle and lower thirds by crushing. A compound fracture was present, the wound of which was treated in the usual manner, and progressed aseptically. On the fifth day the plaster cast was applied, and after the seventh day the patient was allowed to walk about. After forty-five days the fracture was not yet united. A new cast was applied, this time with a hinge at the knee-joint. At the end of five weeks a third cast was put on, under which—115 days after the injury—consolidation took place; so that for the first time the patient was able to go about without a splint. The knee was freely movable; the ankle-joint was stiff. Under massage, etc., the full function of the joint was restored 240 days after the accident, and the patient was able to return to work. One year later the old man returned with a fistula, which had developed at the seat of the fracture. After the removal of a small sequestrum, firm healing took place.

Such cases occur with every method of treatment. On the other hand, no other method gives such astonishing results. Another example is that of an old woman, eighty years of age, who sustained a fracture just below the tuberosity of the tibia. For seven days she was treated in extension, and then a walking cast was applied, and on the ninth day after the injury she walked about without pain. Twenty-six days later the cast was removed, and the fracture found to be consolidated. Three days later she was able to walk about without the cast,—thirty-nine days after the injury. On the fiftieth day after the injury she was discharged. She walked with the aid of a cane without pain. The ankle-joint was freely movable; the knee-joint could be flexed to ninety degrees without pain, and still further under slight painfulness.

Krause has tried the experiment upon himself and found that it is not at all unpleasant to go about in a well-fitting walking cast, after a fresh fracture. He sustained a fracture of both malleoli, and had the leg put up in this method. After the sixth day he was able to go about all of his duties without pain. He could climb stairs and walk for hours. After four weeks the fracture was so firmly consolidated that he used no further dressing.

Except in the extremely severe cases he has used the method with good result. The following case is in point: A laborer, forty-five years of age, eight years before suffered amputation of the left thigh in its upper third. He went about usually on crutches, but sometimes with a peg. This patient was crushed between two bumpers, so that the right leg, to an extent of more than six centimetres just below the middle, was comminuted, the muscle bruised, and the skin lacerated. Fortunately the vessels and nerves were not destroyed. It was important to preserve the limb. After five weeks there was still a small granulating wound, but there was not the slightest sign of callus. A plaster cast was applied high up on the thigh without a sitting-ring, and with a fenestrum over the leg. The patient walked on crutches, as his peg was not comfortable. He was able to walk about all day on this greatly injured leg. Consolidation

took place under a second dressing in ten weeks. The shortening of the right leg was easily compensated by subjecting the lower end of the leg to an operation by a carpenter.

Krause does not advise the immediate application of fenestrated dressing to all fractures. He does it but exceptionally, and only in very simple cases, in which no marked dislocation is present. After osteotomies or resections the cast can be applied on the first or second day after the operation. The same is done with compound fractures with even and broad surfaces and little tendency to dislocation. For this reason all of the cases reported have healed well, without injury from the walking of the patient. For example, a pronounced double genu valgum, in which Macewen's osteotomy was done on the lower ends of the thigh bones, was put up in the "gehverband," and consolidation had taken place in three and a half weeks after the operation. Both knee-joints were perfectly and freely movable. It is recommended to cut a small window over the wounds in order to keep them perfectly dry.

In all severe fractures he waits some days until the swelling has reached its highest and subsided. During this time extension of twenty or twenty-five pounds is applied in oblique fractures of the leg in which there is a tendency to deformity. In fractures of the malleoli, the extravasations of blood into the joint and under the skin are treated with massage and passive motion.

Krause is of the opinion that the ambulant treatment in plaster splints must be limited principally to fractures and osteotomies in the region of the malleoli, the leg, and the lower end of the thigh. He does not employ the method in the handling of oblique fractures of the femur and fractures of the neck of the same. The mechanical conditions are here much less favorable for the application of the plaster ambulant splint than in the leg. He prefers the ambulant splint of Bruns¹ in these cases. This is put on the third or fifth day. It consists of a well-padded adjustable "sitzring," with two lateral telescopic steel tubes, terminating below in a stirrup. Long, lateral

¹ Bruns: Beiträge zur klinischen Chirurgie, Band x.

strips of adhesive plaster are fastened into the holes at the sides of the stirrup by means of straps. This splint can then be drawn out to the desired length, and thus as much extension as is required applied. The "sitzring" about the pelvis gives the counter-extension, and the patient can have a lift put under the shoe of the sound side, and be up and about; when the patient lies down the weight can be hooked fast to the stirrup, and thus the pressure of the pelvic ring is relieved. Thus the patient can be treated with extension both while walking about and while lying in bed.

It is a matter of interest to observe, in presenting the subject of the plaster "gehverband" to physicians, that those who have had but little experience with plaster in the treatment of fractures and who have confined themselves to the old-fashioned methods, usually fail to grasp the idea of the feasibility and value of this method of treatment, whereas with surgeons experienced in the use of the plaster bandage the practicability of the method is at once appreciated.

INDEX TO SURGICAL PROGRESS.

GENERAL SURGERY.

Disinfection of Knives. By Dr. OTTO IBBE (Dresden). The statement that boiling a knife in a soda solution destroys its edge is an old error handed down from one text-book to another. The fallacy of it can be proved by anybody who will try the experiment. If a knife be found dull after boiling it is either because it had rubbed against other instruments or the soda solution was not strong enough.

To protect the edges while the knives are being boiled the author has had a leaden box made containing a tray on which several knives can be laid. The bottom and cover of the box are perforated. Knives can be boiled in this apparatus an indefinite length of time without becoming dull.

The author has carried on some investigations in order to determine the percentage of soda in the soda of commerce.

Pulverized soda contains only from 10 to 20 per cent. of pure soda. Common salt is the most common adulteration.

Crystallized soda has a more constant composition, and is not much adulterated, but it must be remembered that this material, when it is pure, contains only 38 per cent. of soda, the remainder being water of crystallization.

By heating the crystallized soda one gets a mass containing about 90 per cent. of pure soda.

Pulverized soda of commerce should never be used, owing to its uncertain composition and the large amount of salt present. If crystallized soda be used, a 3-per-cent. solution is required in order to make a 1-per-cent. solution of pure soda. If one employs the desiccated crystals, 1 per cent. will give a solution of the required strength.—*Archiv für klinische Chirurgie*, Band XLVIII, Heft 4.

G. R. WHITE (New York).

LYMPHATIC SYSTEM.

Rupture of the Thoracic Duct from Contusion of the Abdomen. By Dr. THOMAS H. MANLEY (New York). The patient, a man, thirty-five years old, of medium height and spare build, was admitted to Harlem Hospital, July 3, 1893. On the morning of that day, about one hour after he had eaten a hearty breakfast, while crossing a street, he was struck with great force over the epigastrium by the pole of a brewery-wagon and knocked down on his back. Before the driver could stop his horses the front wheel passed over the centre of the abdomen. An ambulance was called, and the injured man was immediately admitted to the hospital. At this time he was in a state of great shock. Hypodermic injections of brandy and strychnine were administered and artificial heat applied. The man complained of intense pain in the abdomen on the slightest motion. There were no marks of injury on the integument, except on the right side near the crest of the ilium, where a slight erosion of the integument was discovered. The pulse was 70, the temperature 98° F., and the respirations 20.

As reaction set in the abdomen commenced to distend and everywhere was exquisitely sensitive. On the day after admission the patient complained of pain in the hypogastrium and required catheterization. Except for a slight tinge of blood in the urine its analysis was negative. There was no vomiting. Opium was freely given, and hot stupes applied locally. On the third day peritonitis with enteroparesis was unmistakable. The eyes were sunken, the nose pinched, and the lips and ears cool and blanched. The man was in great mental distress and constant suffering, which it required large doses of opium to assuage. He was nourished altogether by enemata, and was allowed bits of ice to suck to relieve thirst, which now was excessive. The abdomen was hard, sensitive, and flattened, the knees extremely flexed to relieve muscular tension. The temperature on this date was 100.4° F., the pulse 86, and the respirations 32. For five days the patient was about the same, except that he was becoming

somewhat weaker. On July 10 the symptoms commenced to ameliorate, the abdomen was less tender, and he began to demand food. The pulse was 80, the temperature 100° F., and the respirations were 21.

At this time, on the right side, over the right iliac fossa, low down over the course of Poupart's ligament, there was a distinct bulging forward of the abdominal wall. This enlarged and diminished in volume according to the position which the body took, being much the largest when the patient lay on the right side.

It was well defined, and transmitted a distinct fluctuating sensation on pressure. The surface of the integument over it was not reddened, and not hotter than elsewhere. On percussion, it was evident that whatever its nature it had pressed the intestinal coils away from it, for it everywhere emitted a dull sound. It was nowhere sensitive, and on firm pressure could be made to quickly disappear. An exploratory needle showed the collection to be a fluid of a milky color and consistence. An incision was now made into the tumor, when a little more than sixteen ounces of a lactiferous fluid was discharged and secured as it came through the incision. The tumor was lodged immediately behind the peritoneum, over the sheath of the muscles. A drainage-tube was passed into the opening, its free end being engaged in a perforated cork in a pint bottle. In the next twenty-four hours eight ounces of the same fluid were collected through the tube, but a large quantity had made its way out beside the tube and saturated everything in near contact. In the next four days the daily quantity collected averaged from five to six ounces. In the mean time there was much that made its way out into the clothing. It continued to drop more or less for ten days, when it finally ceased. On the fifteenth day the wound had healed and he was up. The man left the hospital August 31, quite restored to health.

A careful microscopic and chemic examination was made of the specimens of fluid evacuated at various times, and it was demonstrated to be pure chyle. The color was a bluish-white, very much like that of woman's milk. Its taste was slightly salty. Its odor was feeble,

very much like that from fresh warm milk. Its specific gravity varied from 1010 to 1019. Under the microscope it was found to contain an abundance of characteristic lymph-corpuscles, granules of fat, broken-down endothelium, and flakes of an ill-defined substance, probably altered protoplasm. It always flowed most abundantly after eating.—*Medical News*, November 3, 1894.

ABDOMEN.

I. A Contribution to the Surgery of the Pancreas.

By Dr. W. KÖRTE (Berlin). The surgical treatment of inflammations of the pancreas and their sequelæ, with the exception of traumatic cases, is not much employed.

The conditions which come most into consideration are traumatic inflammations, suppuration, and necrosis of the pancreas. The last two are often combined. Hæmorrhage from the pancreas is primarily not a condition for surgical treatment; though the subsequent condition of sequestrum formation of the pancreas is a proper condition for surgical interference.

Körte's experience has involved four cases upon which he has operated for suppuration and necrosis, and one other non-suppurative case. Two of the cases operated upon died and two recovered. In the first case the diagnosis was made during the treatment; in the others diagnosis was made before.

The etiology rests probably in the entrance of micro-organisms into the gland from the duodenum. The cause of the spontaneous hæmorrhages and the etiological connection between necrosis of the fatty tissue and necrosis of the pancreas are not yet sufficiently understood.

Körte's cases involved three females and two males, varying in age from twenty-two to forty-eight years. In one was a necrosis of the larger part of the pancreas, in two was suppuration with partial necrosis, and in one case suppuration alone occurred. Two of the patients were corpulent. Disseminated necrosis of fatty tissue occurred in only one case,—that of an emaciated man.

The symptoms in these cases very closely resemble those described by Fitz and Seitz.

They usually began in well persons ; but sometimes the patients had previously suffered from disturbances of the gastro-intestinal tract or biliary system. The symptoms were severe. Vomiting and abdominal pain in the epigastrium were present. There developed great prostration, usually constipation, tympanites, and tenderness. The acute stage is easily confused with other diseases, such as gastro-duodenitis, poisoning, colic from calculus, peritonitis, intestinal obstruction. Sometimes these symptoms abated in a few days or after from one to three weeks. The acute stage may end with collapse and death, usually from hæmorrhage ; or it may run on into a subacute or chronic form. The patients gradually develop gastric disturbances, septic fever, diarrhœa, evacuation of pus per anum, sometimes icterus or bronzed skin, and finally die. In only two cases is it known that after the exfoliation and passage of the necrotic pancreas per anum recovery occurred (Chiari).

In the subacute stage Körte has always observed the symptom which has been referred to so much in the literature,—namely, the appearance of a tumor in the epigastrium, which can be felt between the stomach and colon, and which extended to the left and was sometimes most prominent in the left lumbar region.

The pus which forms in the pancreas and about the organ may rupture through into the bursa omentalis, where it may form an encapsulated abscess or may dissect down back of the peritoneum.

The autopsies show that the pus may take any of the following courses :

- (1) Perforation of the bursa omentalis.
- (2) Burrowing downward to the left behind the descending colon.
- (3) More rarely burrowing down to the right.
- (4) Downward between the layers of the mesocolon transversum or the mesentery.

The diagnosis rests upon the characteristic onset, followed by the

appearance of the epigastric tumor or the lumbar swelling at the left side.

This may be confused with other purulent infiltrations into the bursa omentalis, as occur in gastric ulcer or carcinoma. In the second form perinephritic suppuration must be eliminated by very careful examination.

Exploratory puncture in the first form may be of possible value, when the preparations are ready for following with immediate operation. Puncture is also advisable in the retroperitoneal suppurations.

The pus is very rich in fat, and contains flocculi of grease, necrotic shreds, and few, if any, fatty pus-cells. In one case streptococci were present, but more frequently the intestinal bacilli were found in the pus.

The treatment depends upon the diagnosis. Abscesses of the bursa omentalis require laparotomy, and suture and drainage of the abscess wall as a cyst. The retroperitoneal form can be treated by incision in the flank.

In the course of two cases bits of pancreas and pancreas secretions were discharged. Two patients recovered and two died. One of these which was operated upon late died after the development of an abscess in the spleen and hæmorrhage from that organ. The other perished from a retroperitoneal burrowing of the pus into the mesocolon and mesentery.

No operations have been reported which were performed before a diagnosis of pancreatic suppuration had been made.

Without operation the prognosis is very bad.

The study and successful treatment of cysts of the pancreas are recent data. As yet but a small number have been operated upon, and most of those which have been recently encountered have been pre-diagnosticated. Körte has diagnosticated and operated upon two cases.

From these observations and from a study of the literature Körte is of the opinion that many of the cases reported as cysts of the pancreas are really collections of fluid in the bursa omentalis.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

II. Extirpation of the Sarcomatous Floating Spleen.

By DR. W. WAGNER (Königshütte). The author successfully removed such a spleen from a woman twenty-seven years of age. The tumor weighed 1285 grammes. The blood showed no changes. The microscopic examination of the tumor showed a great richness in round cells with very large nuclei. In no part of the growth was any spleen tissue to be found.

Primary sarcoma of the spleen is very rare. Weichselbaum speaks of two such cases, which were accidentally discovered at autopsies.

Four cases have thus far been operated upon and reported by the following authors:

- (1) Billroth, 1884. Died of recurrence six months later.
- (2) Fritsch, 1888. Recovered.
- (3) Kocher, 1888. Died from recurrences in the lymphatics,—lympho-sarcoma.
- (4) Frothmann, 1889. Died fifty hours after the operation from hæmorrhage.

The first three cases were women; the last was a man.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

III. The Removal of an Incarcerated Gall-Stone from the Cystic Duct. By Dr. HANS KEHR (Halberstadt). Kehr reports that among seventy-seven laparotomies for gall-stone he has met in twenty-six cases incarcerated concretions in the cystic duct. The ordinary operation not resulting satisfactorily in seven cases, he adopted the plan of direct excision of the stone from the duct, and sewing up the opening through which it was removed.

He had previously operated by suturing the gall-bladder to the abdominal wound, and waiting till the back pressure in the cystic duct dislodged the stone. Ordinarily the stone can be removed through the fistula by means of a proper spoon or forceps. In two of Kehr's cases he was unable thus to remove the stone, and there-

fore opened the abdomen in the linea alba between the xiphoid process and the navel. Through this opening the cystic duct was easily reached and incised over the incarcerated stone. After the removal of the stone the opening in the duct was closed by a double row of sutures. The outer fistula served as a safety opening for drainage. In both cases the second operation caused the fistula, which had been a mucous fistula, to become a biliary fistula. It closed in three weeks. In one case the stone became dislodged and moved into the choledochus; and caused the regret that it had not been operated upon while it was in the cystic duct.

When the stone cannot be dislodged by the hand in the abdomen the excision of the stone from the cystic duct should be undertaken. The technique is the same as that of choledochotomy. Cystostomy should always be combined with cysticotomy. The biliary fistula closed in all of the five cases thus operated upon.

The author has done forty-nine cystostomies. Of these, all recovered that were free from complications,—and the number was forty-five,—such as suppurative cholangitis, carcinoma, etc.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IV. The Projections of Calculi into the Ducts of the Gall- and Urinary Bladder. By Dr. HELFERICH (Greifswald).

(a) *Gall-Bladder*.—Helferich removed by cholecystotomy from a woman, twenty-seven years old, a stone the size of a walnut, which was characterized by a peculiar flat, warty surface, and a small peg-like process at the lower end. The latter had the form of an outgrowth of the gall-bladder into the cystic duct. Shallow lines enclosing little planes also marked the surface, and represented the normal folds of the mucous membrane.

(b) *Urinary Bladder and Ureters*.—The same author removed by the suprapubic route from a twenty-eight-year-old physician a large calculus. After its removal a small surface could be felt, which seemed like an incrustation. Attempts to remove this revealed that it was a stone, and, indeed, not lodged in an ordinary diverticulum,

but in the lower end of the ureter, which it involved for some little distance, being slightly curved. After its extraction by carefully dilating the mouth of the ureter, a quantity of stinking urine and three smaller round stones gushed forth. The case progressed favorably, but the patient died some months later at his home before he could make up his mind to have the diseased kidney operated upon. —*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

EXTREMITIES.

I. The Technique of Amputating Limbs. By Dr. S. CREDÉ (Dresden). Credé claims that, according to the best statistics, not more than one-third of the amputations of limbs heal by first intention. Out of twenty-two such operations done by himself in the last two years, less than half were for injuries, and the rest were for disease. Two-thirds of these healed by first intention in the true sense of the word, and one-third healed with small local infections which with one exception were healed within three weeks. The exceptional case took four and a half weeks to heal.

Contrary to the general custom among the majority of surgeons of using only skin flaps, Credé makes a flap containing as much muscle as possible. With a wet bandage of coarse mull, eight centimetres broad, he binds the flaps tight enough to bring the skin edges together, and uses no suture or drain. Over the whole he then applies his dressing. The compression which is applied directly upon the skin of the stump greatly diminishes the serous discharge, entirely prevents hæmorrhage, and renders suture and drainage entirely unnecessary. If at some place the skin does not quite come together, the narrow strip of granulation which results heals very quickly. The skilful application of the compression bandage must be learned by experience; but it is not difficult. The bandage makes first a longitudinal excursion on the lower side of the stump, beginning above and passing down behind the stump up over its end and ending in front and above. Then come oblique and circular turns, and lateral longitudinal turns, until the entire stump is methodically enveloped. After the first layer has been applied the skin edges can be seen

through the coarse mull, and it can be observed whether good apposition has been effected. The bandage is allowed to remain in position eight or ten days, when usually the deeper parts are firmly healed.

If pain or high fever develop during the first few days, Credé splits the whole dressing down in front, does not take it off, but fastens it by a looser bandage. Abscesses always develop quickly, and work outward instead of finding their way into a drain. They heal very quickly. All of the cases were able to leave their beds in ten days, with the exception of those who had other injuries which prevented.

With this method it makes no difference whether the operator works antiseptically or aseptically, whether he uses the Esmarch bloodless method or not, about half the time is saved by this operation.

This method is especially recommended in military surgery. The compression prevents the danger of hæmorrhage during transportation.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

II. Laceration of the Plantar Fascia. By Dr. LEDDERHOSE (Strassburg). Ledderhose has observed in ten cases swelling of the plantar fascia the size of a pea in the middle and median portion of the sole of the foot, which, in some cases, were the cause of much discomfort. These had developed in connection with injuries of the leg and foot, usually fractures. The trouble is observed at the first attempt at walking after a long period of confinement.

Though these nodules resemble in many respects the contractures of the plantar fascia which Madelung discovered in patients suffering from Dupuytren's contracture of the palmar fascia, still they must be classified etiologically as something different. In the cases which Ledderhose has observed the symptoms were due to an actual rupture of the plantar fascia. This opinion is based upon the following grounds:

(1) The nodules were found only in the foot of the injured side, and never in the hands were there any Dupuytren's contractions.

(2) A patient who had sustained a fracture of the malleolus by falling observed that immediately after the accident swelling and pain were experienced at the points where the plantar nodules afterwards developed.

(3) In two other cases the same symptoms occurred after a fall upon the foot without a fracture being discernible. One of these patients fell from a considerable height, landing upon the right foot. After lying in bed for some weeks and then attempting to walk severe pain was experienced in the hollow of the foot, so that walking was only possible on the outer edge of the foot. About the middle of the first metatarsal bone was a nodule about the size of a bean. This was excised, and microscopic examination showed that it was fascia traversed by a line of young scar tissue. It contained numerous newly-formed vessels and connective-tissue cells. Around the vessels was a deposit of pigment, which pointed to its traumatic character.

Ledderhose assumes that in this and in part of the other cases the great strain upon the fascia caused its rupture, and that later, with the attempts at walking the scar became irritated and hypertrophically inflamed. In the cases in which no tearing of the fascia occurred at the time of the accident, he believes that the splint which is worn for a long time causes retraction and nutritive disturbances of the fascia, and that then, when the foot is used, rupture of the fascia occurs in its weakest place, and an hypertrophic scar forms.

The nodules tend to subside in the course of time. Excision is necessary only in occasional cases. An arrangement in the shoe to take the pressure off of the tender spot is recommended.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

MALE GENITO-URINARY ORGANS.

I. Case of Castration for Relief of Enlarged Prostate.

By C. MANSELL MOULLIN, F.R.C.S. (London). E. B., aged eighty-one, was admitted into the London Hospital on June 21, 1894, suffering from retention arising from enlargement of the prostate. There was a history of several previous attacks. The prostate as felt *per rectum* was enormously enlarged, and no catheter could be passed,

the growth blocking the urethra completely. Suprapubic aspiration was performed, and after that the patient was able to relieve himself, but very slowly and incompletely. At the end of a fortnight no progress had been made; the patient was losing ground, and cystitis setting in. Suprapubic prostatectomy was considered too hazardous. The formation of an artificial urethra, as the patient was very restless and becoming more and more childish, could not be recommended. Castration was proposed and agreed to.

The operation needs no comment; there was no shock, and the patient did well. The next day urine came more freely. Ten days later the prostate was smaller. Three weeks after the operation it had disappeared. An ordinary catheter passed with ease and without having the handle depressed to any extent, and when the finger was in the rectum all that could be felt was a fusiform thickening extending along the catheter, so small and soft that the shaft could be felt everywhere through it.—*British Medical Journal*, November 3, 1894.

II. Case of Rupture of Male Bladder Successfully treated by Abdominal Section and Suture. By Dr. JAMES MURPHY (Sunderland). A man, aged twenty-four, spent an hour or two, on May 28, 1884, in a public house, during which time he drank some seven or eight gills of beer; he then felt a desire to pass water, and left the public house to proceed to a urinal round the corner. Just as he got outside the door, a runaway horse and cab struck him against the wall and knocked him down. He was soon after admitted into the Sunderland Infirmary, and some two hours after the accident was seen by the reporter. He was a man the very picture of health, good tempered, docile, and obedient. He did not complain much of pain, nor was he much collapsed. There was slight abrasion of the penis and lower portion of the abdomen; a catheter was passed, and drew off about half an ounce of blood-stained fluid; ten ounces of boracic-acid solution were injected without giving much pain; about an ounce returned. On percussion there was distinct resonance above the pubes, and distinct dulness in

both flanks. In the left flank a distinct splash could be obtained. The diagnosis of ruptured bladder was complete.

Abdominal section was at once performed, and on opening the peritoneum about forty ounces of fluid were removed. The bladder was found to have a tear in it going in a straight line from before backward over the whole of its fundus,—that is, the rupture extended from back to front over the whole surface of the bladder, covered by the peritoneum, and even extended a little beyond that at each end. The peritoneum was stripped off the line of rupture for one-eighth to one-quarter inch. An assistant seizing each side of the ruptured bladder between his fingers and thumbs drew it up. With a small needle curved on the flat and held in a needle-holder, a series of fifteen catgut sutures were passed through the muscular wall of the bladder, beneath the peritoneum, or, rather, internally to it, as it was stripped off, introducing the needle about one-eighth inch from the margin of the rupture and passing it through the muscular coat as near as possible to, without penetrating, the mucous membrane. The sutures were knotted, and ten ounces of boracic acid lotion were injected into the bladder, which was found to be water-tight. The peritoneum was sutured over the rupture. The peritoneum was again washed out, a glass drainage-tube introduced into the pelvis, and the abdomen closed. A No. 10 catheter was passed into the bladder and secured. To the end of the catheter a piece of drainage tubing was attached, which was brought out underneath the patient's thigh, raised between two pads, and the end of the tubing was placed in a large bottle underneath the bed in such a manner that the nurse could see that the urine was constantly flowing.

He passed from fifty to seventy ounces of urine daily; for the first thirty-six hours it was blood-stained; the catheter was kept in for eight days; for the following two days the water was drawn off by means of a catheter, and for the next four or five days he was told to pass his urine every three hours while he was awake. The drainage-tube in the abdomen was removed on the second day after the operation; he was kept in bed for fourteen days, and he was detained at

the hospital twenty-seven days. With the exception of a slight urethritis there was no drawback to his convalescence; he is now perfectly well, and his bladder can hold twenty ounces, and possibly more if required.—*British Medical Journal*, November 3, 1894.

III. Contributions to the Surgery of the Ureters. By Dr. KONRAD BÜDINGER (Vienna). The author attempts to present a systematic and complete treatise on the subject of the surgery of the ureters, besides presenting the results of his own experiments on animals.

In case a ureter be divided during an operation the surgeon can do one of the following operations:

(1) Primary nephrectomy, either transperitoneal or retroperitoneal, through a new incision.

(2) Formation of a ureteral fistula in the abdominal wall with a view of closing at a secondary operation either by nephrectomy or in some other manner.

(3) Ligation of the kidney end of the ureter to bring about atrophy of the kidney.

(4) Suturing the ends of the ureter together.

(5) Immediate implantation of the upper piece of the ureter into neighboring organs (bladder, rectum, etc.).

(1) Immediate nephrectomy is most strongly to be condemned, partly on account of the danger of the operation, but more especially from the fact that one cannot be sure that the other kidney is capable of doing the work of both, since it is a frequent occurrence in patients with large abdominal or pelvic tumors to find one or both kidneys diseased.

(2) The formation of a fistula in the abdominal wall is, to say the least, not good surgery. The escape of urine is always an annoyance, the kidney is open to septic infection through the ureter, and the secondary operation is dangerous. In a few instances these fistulae have been closed by making an opening from the ureter into the bladder.

(3) It has been found that if a ureter be tied in animals the

kidney will atrophy. It is possible that it has been tied in the human subject without the knowledge of the operator, and without any detriment to the patient. Simon once closed a ureteral fistula by caustics, but was obliged to open it again on account of the pain.

(4) Numerous operators have sutured the divided ends of a ureter together. The methods recommended for this operation are as follows:

(a) Insertion of a soft catheter into the divided ends of the ureter and its withdrawal before the last sutures are tied.

(b) Opening of the bladder and passing a catheter into the ureter. The cut ends can be sutured over the catheter, which is left in place several days.

(c) Dilatation of the lower segment and drawing the upper segment into it before suturing.

(d) Tying the lower end, and making a slit in the side through which the upper end can be drawn.

(5) It is well known that urine can be retained by the rectum without producing any irritation, and the sphincter is strong enough to allow the rectum to act as a reservoir for it.

These facts have led many surgeons to implant the ureters into the rectum. The results, however, have not been gratifying. The ureters have usually broken loose or infection has passed up them to the kidney. Moreover, in ectopia of the bladder—the condition most frequently requiring this operation—the sphincter is usually weak and urine cannot be retained.

In certain cases of ectopia the ureters have been fastened into an artificial urethra after extirpation of the bladder.

Implantation into the bladder promises good results, but the operation has not been done often enough for one to form an opinion of its value. It is done by making an incision in the anterior wall of the bladder, then cutting a small hole through the posterior wall through which the ureter can be drawn and held in place by sutures. Another row of sutures is inserted on the outside of the bladder.

Novaro makes a one-centimetre incision into the bladder, then

slits up the ureter one centimetre, making a V-shaped opening. Two limbs of the V are sewed to the edges of the slit in the bladder so that the knots will lie inside of the bladder. The remaining side of the V is sutured to the bladder by Lembert sutures. An iodoform gauze drain is put in the wound and left five days.

The author has made an improvement in the method of implanting the ureter into the bladder in that he has adopted a method made use of by Witzel in gastrostomy. Witzel's method is to insert a small tube into the stomach, then sew two folds of the wall of the stomach over it, so that the opening into the stomach leads through a narrow passage.

The operation, as practised on dogs, is as follows: Laparotomy: The ureter is found and cut across. A small opening is made into the bladder and enough urine let out so that one can easily pick up the necessary folds. The end of the ureter is slit up a little and thrust through the slit in the bladder. It is held in place by two sutures which go through the serous and muscular coats of the two organs. A row of Lembert sutures are next inserted which draw two folds of the bladder-wall over the ureter and build a canal in which it runs. Four sutures are sufficient, one at the opening, two above and one below. The distance between the two folds should be about 1.5 centimetres.

The advantages of this method are as follows:

(1) No leaking of urine soon after the operation, since filling of the bladder tends to obliterate the canal.

(2) No sutures are put in the bladder, which might form the starting-points for concretions.

(3) Avoidance of a stricture at the opening of the ureter which frequently takes by simple implantation from the numerous sutures about the opening.

(4) Oblique entrance of the ureter through the wall of the bladder analogous to its normal course, thereby retaining an important factor in the secretion of the urine.

In certain cases of fistulæ, strictures, and injuries at the bladder

end of the ureter, operations on the ureter can be made extraperitoneal. The old method is to make an incision similar to the one for ligation of the iliac artery.

Israel proposed an incision beginning under the twelfth rib, running parallel with this as far as the tip, then obliquely downward to near the middle of Poupart's ligament, and then inward to the edge of the rectus muscle. It is not necessary to make the incision as long as this in most cases. The under half of the incision is sufficient if one wishes to implant the ureters into the bladder.—*Archiv für klinische Chirurgie*, Band XLVIII, Heft 3.

G. R. WHITE (New York).

FEMALE GENITO-URINARY ORGANS.

I. Case of Extirpation of Sarcoma of Kidney. By Dr. L. H. DUNNING (Indianapolis). A child, two years old, presented a large, solid tumor located in the left side of the abdomen, extending from beneath the ribs to the crest of the ilium and beyond the median line towards the right. The abdomen was markedly protuberant, and the left half of it was filled with the tumor. The abdomen walls were tightly drawn over it, and seemed thin. No fluctuation could be elicited, and the tumor seemed fixed. Nothing abnormal in quantity or appearance of urine was ever observed by parents or physician. The child was markedly emaciated. It was difficult for her to walk. She suffered much from indigestion and difficult breathing. The tumor was extirpated June 28, 1893. A median incision was employed. The tumor was found behind the peritoneum. It was easily exposed and brought into view; a very long incision was required to deliver it. It extended from one inch above the pubes to near the ensiform cartilage. There were not many adhesions. The tumor was pedunculated, and sprang from the kidney. The ureter and blood-vessels were tied *en masse*, and the tumor and the kidney removed. No stitches were used in the posterior layer of the peritoneum. A careful toilet was made of the peritoneal cavity, and the abdomen closed without drainage. The patient made

an excellent recovery, and was taken home near the end of the fourth week. For a time she continued to gain in health and strength, but rapid recurrence took place, causing death nine months after operation. The primary tumor was shown by microscopical examination to be a round-celled sarcoma.—*American Gynecological and Obstetrical Journal*, November, 1894.

II. Successful Case of Implantation of a Severed Ureter into the Bladder. By Dr. F. KRUG (New York). The patient was a colored woman, about thirty years of age, whose entire pelvis was filled by a solid fibroid mass which reached up to the umbilicus, somewhat nodular in shape and absolutely immovable.

The operation was performed last spring. On opening the abdomen, universal adhesions with the parietes and all the viscera were found, requiring a good deal of preliminary ligating and severing. When the upper border of the tumor had been freed, the left tube was found to contain pus. There was also an abscess in the left ovary. They were both tied off, and the same procedure was repeated on the other side, the right appendages being also the seat of extensive suppuration. The larger portion of the fibroid mass being wedged in the pelvis, and entirely intraligamentous, it was necessary to put in several ligatures on either side before the tumor could be shelled out and the uterine arteries reached. It was then found that the left ureter had been included in one of the ligatures and had been severed, although special care had been taken to avoid just such an occurrence. But, owing to the fact that the tumor had grown intraligamentous, and, in unfolding, the two sheaths of the broad ligament had pushed the ureter forward, the latter organ ran in front of the tumor near the abdominal wall, and was ligated and cut in a place where it was least expected. After the entire uterus had been removed, the vaginal opening closed, and the peritoneal flaps brought together, the distal end of the cut ureter was tied off, and an incision of about an inch and a half was made into the bladder near the vertex. A fine needle threaded with finest catgut was then passed

into the bladder from without at a point about an inch below the incision. The needle was then passed out through the incision, then through the ureter from without within, again through the incision in the bladder, coming out at a point near the original insertion. A second suture was passed in the same way, taking hold of the other side of the ureter. The cut proximal end of the ureter was now split between the two sutures, and the two sutures loosely tied so as to suspend the ureter in the bladder. The incision in the bladder was then closed up by four tiers of running and interrupted sutures, the first two tiers including the mucous and muscular layer of the bladder, while the next two brought the peritoneal investment together. In applying these sutures care was taken not to constrict the ureter by too much pressure, and at the same time to close the incision tightly enough to prevent leakage. The abdominal wound was now closed, and a permanent catheter inserted in the bladder. The latter was removed on the fourth day after the operation. The patient was catheterized regularly during the next few days, and attended to that herself for another week. The bowels moved on the third day.

Entire convalescence was smooth, without an untoward symptom. The patient left the hospital three weeks after the operation, and has been well ever since. Cystoscopical examination has since proved the patency of the implanted ureter.—*American Gynecological and Obstetrical Journal*, November 1894.

III. Hysterectomy Perineo-Vaginalis. By Dr. SCHUCH-
ARDT (Stettin). During the latter part of the year 1893 the author published in the *Centralblatt für Chirurgie*, No. 51, a method by which it was possible to remove from below a uterus which had become fixed to the pelvis by carcinomatous infiltration, while in the ordinary vaginal extirpation the operation has to be carried on within a very limited working space, and the broad ligaments have to be tied quite in the dark; by the aid of two accessory incisions the field of operation can be so much widened that not only the uterus can be easily handled but every vessel can be separately treated and the broad

ligament can be easily examined throughout. Both ureters can be isolated for a long distance, and, when necessary, a portion of the diseased bladder can be removed.

These accessory incisions are,—

(1) The lateral division of the entire vaginal wall from below as far up as the cervix.

(2) An incision which is a continuation of the lateral incisions, and which is carried posteriorly to a point level with the apex of the coccyx, encircling the rectum like a bow.

During the operation the patient lies upon the back with the legs well elevated. The skin incision and the lateral vaginal incision are made on the side upon which the broad ligament is diseased. The incision begins between the posterior and middle thirds of the pudendal lip, curves slightly outward and about the anus, keeping about an inch and a half from the latter, and ends on a level with the apex of the coccyx. In its anterior part it involves chiefly the fatty tissue of the *cavum recto-ischiadicum* until the outer vaginal wall is exposed. From here the vagina is split as far up along its side as the cervix uteri. In extreme cases the incision reaches posteriorly to the *ligamentum sacro-ischiadicum*, which need never be divided. When necessary the coccyx or even a piece of the sacrum can be removed. The rectum does not appear in sight during the entire operation, but is covered by the levator ani muscle. The wound gapes so easily that it is scarcely necessary to use retractors to get a good view of the field of operation. The further technique of the hysterectomy *perineo-vaginalis* is the same as that of the ordinary vaginal extirpation, excepting that all of the steps are carried out with the greatest ease and everything is within view of the eye.

The experience of Schuchardt involves five cases, all successful, in which only one side of the vagina and perineum had to be incised. He has found that incision on only one side suffices for the removal of deposits from the broad ligament on the opposite side. The duration of healing is not longer than in the old operation, for in all cases he has found the accessory lateral incision firmly healed while the stump of the parametrium was still granulating.

These incisions heal so quickly that the author has applied this in operation upon a fresh case as well as those well advanced. In this case the extirpation of the womb, inclusive of the accessory incisions, consumed thirteen minutes. At the end of three weeks the patient was discharged cured.

This operation is very preferable to the sacral and parasacral methods in complicated cases, because the technique is much simpler and it is more quickly performed, and in contrast to the longer period of healing the patient can be dismissed as soon as after the ordinary operation.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

JAMES P. WARBASSE (Brooklyn).

IV. The Treatment of Both Mobile and Fixed Retroverted Uteri by Vaginal Fixation. By Dr. ALFRED DUHRSEN (Berlin). The author presents the histories in full of 194 of his 207 cases of vaginal fixation, a number large enough and observed long enough to enable him to render a tolerably correct judgment of the worth of the operation.

The technique of the operation has been modified very extensively of late. At present the operation is done as follows: The patient is placed on her back, the perineum is retracted by Simon's speculum, and the cervix drawn down with tenaculum forceps. A transverse incision one centimetre long is made in the anterior vaginal wall at its insertion in the cervix, this is extended on either side with scissors, keeping close to the uterus to avoid injuring the ureters. The upper edge of the incision is seized by forceps and retracted while the bladder is freed with the finger as high as the top of the cervix. It is a mistake to push the finger about in the cellular tissue above the bladder. The peritoneum may be opened now or at a later stage of the operation. The uterus is brought into anteversion by passing a curved needle carrying heavy silk through the body of the uterus as high up as possible. By drawing on this suture another can be passed higher up; a third or fourth suture may be necessary before the fundus is reached. After the provisional sutures are in place the

tenaculum forceps are removed and the cervix pushed back and up while the fundus is drawn forward by the sutures. If not already opened the peritoneum can be picked up with forceps and incised. The free edge of the peritoneum is sewed to the edge of the vagina, forming a peritoneal covering to the bladder and preventing it from forming adhesions to the uterus. The uterus is examined with the finger and any adhesions are ligated and divided. The ovaries are drawn out, and if any cysts are present they are touched with a Paquelin cautery. Two or three silkworm-gut sutures are passed in a sagittal direction, beginning by passing through the vagina near the incision and the peritoneum attached here, then through the fundus between the tubes, making exit one-half inch lower down, then brought out into the vagina again. The sutures are held with clamps until they are tied, after which the vaginal incision is sewed up longitudinally.

It is not absolutely necessary to open the peritoneum, and in all the earlier cases it was not done. The advantages of doing it are that adhesions can be severed which would otherwise cause the operation to fail, the bladder becomes less involved in the scar, and the entire operation can be done under the direction of the eye.

It is customary to combine this operation with other operations on the vagina, cervix, or perineum. Curetting is always done as a preliminary measure.

Of 205 patients operated upon but one has died, a result as good as that for curettement. Among 189 cases examined at various times after the operation the uterus was found anteflexed in 157, and had become retroverted in 47 cases. In at least 34 of these 47 cases the relapse had occurred during the first nine months (81 per cent. or larger). Seventy-nine cases were found free from recurrence at a period varying between nine and thirty-two and a half months.

Leaving out doubtful cases and those not observed long enough we have a total of 111 cases, with good results in 79 (71 per cent.) and 34 failures (29 per cent.)

Pregnancy has occurred in twenty-four cases, five of them terminating by abortion. In about half of the cases pain was felt in the

back and side, accompanied by more or less trouble from traction on the bladder. Twelve cases were observed after the puerperium, and the uterus was found anteverted in nine, retroverted in three.

Most of the cases operated upon were done by old methods. The peritoneal cavity was not opened except in a few of the recent cases. Where a recurrence has taken place, it was usually found to depend upon the presence of peritoneal adhesion attached to the uterus.

By following the technique here given and seeing that the cases have proper care after childbirth, the statistics can undoubtedly be much improved.—*Archiv für Gynäkologie*, Band XLVII, Heft 2.

G. R. WHITE (New York).

BONES, JOINTS—ORTHOPÆDIC.

I. A Consideration of 168 Cases of Fracture of the Spine. By Dr. HERBERT L. BURRELL (Boston). The conclusions and analysis of 168 cases of fractures of the spine, including 12 laminectomies (8 by the author and 4 by his colleagues), form the basis of this paper. The cases were treated at the Boston City Hospital. Eighty-two cases of fracture of the spine occurred previous to 1887, in which year the author made a study of them, and concluded that the method of treatment which promised most for their relief was, as soon as possible after the injury, to anæsthetize the patient, suspend him, and, after forcing back into a relatively normal position the displaced fragments, to apply a plaster-of-Paris jacket. Although in a few instances brilliant results have been obtained by this treatment, the author now, after a further experience of seven years, during which 86 additional cases have been observed, has given it up as of less value than a carefully-performed operation.

In the first series of cases there was a percentage of recovery by the expectant plan of treatment of 22 per cent.; in the second series (86 cases), in which the treatment was largely influenced by his paper of 1887, there was a percentage of recovery of 33 per cent. This increase of 11 per cent. is striking, and of great value when it is

considered that we have a hopeless condition to deal with. In the first series of cases, 18 patients recovered; 9 recovered "useful,"—that is, could walk; and 9 recovered "useless,"—that is, were bed-ridden. In the second series of cases (86), 28 recovered; 19 were "useful," and 9 were "useless." Not all of the cases were treated by the immediate rectification of the deformity; in fact, it was applied during the year 1887 four times; during the year 1888 twice; during the year 1889 three times; during the years 1890 and 1891 twice; and only once in 1893. This shows that the influence of the paper was waning, and that surgeons were losing confidence in the method; nevertheless, 18 of the 86 cases were treated by immediate suspension, correction of the deformity, and fixation by plaster-of-Paris jacket; 8 recovered "useful," a percentage of 44. This is a large percentage of recovery, even in selected cases, and it must be clearly understood that this method of treatment was not applied in cases where there was much shock, for it is a very severe measure.

Five operations have been performed in the second series of cases, 4 of them at the end of several weeks or months, and 1 of them immediately following the injury. This last patient died almost immediately. The other four cases were not benefited by the operation. Three of these operations were performed by the writer, and in two instances they were performed some weeks after the immediate rectification of the deformity had failed.

The consideration of these statistics and tables of operation convinces the author that the "do nothing" principle of treating these cases should be abandoned, and that what we are to do in these cases must be done immediately after the injury. Autopsies showed clearly in a number of instances that where the bodies of the vertebræ were displaced upon themselves and the cord was not torn, the pressure of twenty-four to forty-eight hours upon the cord produced irremediable softening in its substance, so that any relief which we are to give these cases must be at once. The tables of operation, although they are few in number (five), do not hold out any encouragement as to operating long after the injury.

Of the 8 personal cases of laminectomy 3 were performed for spinal caries and paraplegia; 2 of these were brilliant successes, 1 of them died; the other 4 cases were for fracture of the spine, 1 alone of which was successful, 1 died, and the other 2 recovered "useless." In none of these instances of laminectomy for fracture of the spine had he been able to operate earlier than four days after the injury. He is strongly convinced that the next step will be to operate within the first twenty-four hours.

What shall be done in the future with these cases? Shall they be treated expectantly, shall they be operated on, or shall they be suspended and the deformity rectified? From this series of statistics it would seem as if immediate rectification gave the best results, but if the application of a form of treatment which at best consists of crushing back into its relatively normal position the complex structures that make up the spine gives an increased percentage of recoveries of 11 per cent., how much greater percentage of recovery may we not obtain from an early, careful, aseptic operation, with the removal of the fragments or plates of bone that may be pressing upon the cord by the skilful use of bone-forceps, rather than the use of a "hit-or-miss" method of treatment?

It seems to him, therefore, that all fractures of the spine, including those of the cervical region where there is paraplegia or deformity, should be operated on unless contra-indications exist in the way of shock. This operation should be immediate, for irremediable damage occurs to the cord by pressure alone.—*British Medical Journal*, October 27, 1894.

II. The Operative Treatment of Arthritis Deformans and Chronic Articular Rheumatism. By Dr. MÜLLER (Aachen).

The author presents a careful analysis of cases to determine if operative procedure is justifiable in chronic joint affections. The indications for the operation were deformity of the joint, loss of function, and severe pain. The joints operated upon were the hip, knee, and wrist. The hip was resected eight times for arthritis deformans, with results as follows:

- (1) Patient died from operation.
- (2) Patient not observed long enough after operation to determine the ultimate result.
- (3) Patient, aged fifty-nine years, free from pain and able to go about on crutches.
- (4) Patient, aged forty-nine years, able to go on crutches, with prospects of improvement.
- (5) Patient, aged seventeen years, has movable, useful joint.
- (6) Patient, aged seventeen years, able to walk four miles without becoming tired.
- (7) Patient, aged thirty-eight years, two and a half years after operation able to do laborer's work.
- (8) Patient, aged thirty-three years, can walk about without a cane.

In all of the cases there has been relief from pain, and in no case has a true recurrence taken place.

Resection of the knee for the same disease has given results as follows:

- (1) Patient died.
- (2) Good result two years after operation.
- (3) The patient was free from pain, and could go around the room with help.
- (4) Result good two years after operation.
- (5) Pain continued in the joint, but was probably due to central nervous causes.
- (6) Arthrectomy with removal of diseased synovial membrane and chiselling off of the cartilaginous growths about the ends of the bone. Result good. Movable joint.
- (7) Arthrotomy as in the previous case. Recurrence of the deformity but no pain, and the motion was only slightly limited.

In the wrist the upper row of bones were removed in two cases, with a good result in each case.

For chronic articular rheumatism arthrotomy has been performed three times and resection once. Partial resection of the wrist has

been done once. In all of these cases the result was reported as good and no recurrence.

The author is still in doubt as to the place the operation will have in the future, and is not prepared to go as far as Schüller, who asserts that all cases of chronic arthritis resisting therapeutic measures should receive operative treatment.—*Archiv für klinische Chirurgie*, Band XLVIII, 1894.

III. A Further Contribution on the Subject of Bone-Disease in Typhoid Fever. By Dr. P. KLEMM (Riga). As a supplement to an article which appeared in the *Archiv für klinische Chirurgie*, Band XLVI (abstracted for the ANNALS OF SURGERY for July, 1894), the author presents the history of another case of bone-disease in typhoid fever.

A boy, sixteen years old, entered the hospital October 29, 1893. When nearly cured of his typhoid developed a swelling of the thigh, which increased rapidly and became emphysematous. He died December 25. The autopsy showed typical bone lesions of typhoid. There was a superficial necrosis on the outside of the femur, the periosteum was destroyed, and the marrow was red and hæmorrhagic but not fluid. About half a litre of fluid was evacuated, which was made up for the most part of detritus from broken-down tissues and fat with but few leucocytes. Careful bacteriological examination showed the presence of two kinds of bacilli, the bacillus of typhoid and the bacillus coli communis.

We must assume that the typhoid bacilli were carried by the blood and set up a pathological process in the bone and the neighboring soft parts, differing from suppuration but resembling more the process that takes place from irritants placed under the skin. The bacilli coli communi must have been carried in the same way, and had an action synergic with the typhoid bacilli, besides causing the formation of gas.

The pathological significance of the bacilli coli communi is still in dispute, but in this case at any rate this organism must be consid-

ered an important factor in the pathological process.—*Archiv für klinische Chirurgie*, Band XLVIII, Heft 4.

G. R. WHITE (New York).

IV. Operative Abortive Treatment of Osteomyelitis.

By Dr. KAREWSKI. In the surgical polyclinic of the Jewish Hospital and in private practice Karewski has treated a large number of cases of osteomyelitis, among which the early cases are of especial interest. Fourteen cases come into account in considering the early operation, —*i.e.*, cases which came to the operation within the first ten days, by which the appearance of constitutional symptoms is prevented and local disturbances to any considerable degree do not develop. Only under such circumstances can one speak of early operation. Extensive suppuration, necrosis, and metastasis always endanger life and the diseased limb. The important point in the therapy of the disease is that acute osteomyelitis can be diagnosed in the early stages when the symptoms of the inflammation appear, by the fever, pain, swelling, and functional disturbances. In children it must be remembered that diseases giving similar symptoms are very rare.

Out of the fourteen cases, six were operated upon before any suppuration could be discovered. In these the periosteum was very hyperæmic, injected, and oedematous. In the bone a very small capillary fistula was found here and there, from which a drop of pus oozed. When the medullary canal was opened the marrow pressed out, and was observed to be bluish-red, hyperæmic, and dotted with small points of suppuration. In other cases a periosteal abscess had formed, and the changes in the marrow were even more advanced.

Of the first six cases, three were taken from the third to the fourth day, and three from the fourth to the seventh day of the disease. Of the others, five were taken on the fourth to the sixth day, and three on the seventh to the tenth day. In the first group were no metastases; in the second group many suppurative foci were observed in six cases.

Karewski in all cases chiselled open the entire length of the

bone, and removed the whole of the diseased marrow. The operation can be done without hesitation, and is well borne by young children when care is taken that no large amount of blood is lost. Out of his fourteen cases he had no deaths, and in from three weeks to six months saw all of the patients fully recovered without any necrosis or fistula remaining. Nor were any recurrences or disturbances of growth observed. A number of the younger children died later of other diseases. Karewski presented before the Congress a boy who had been operated upon eight years before; a girl two years previously; and a third operated upon eight months before, and which had been healed for four months.

On the other hand, he lost a thirty-year-old man from septicaemia, who had been operated upon for influenza-osteomyelitis.

As a *résumé* he thinks it proper to speak of the early operation as the abortive treatment of osteomyelitis.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

V. Early Operation in Osteomyelitis. By Dr. E. KÜSTER (Marburg). Küster classifies as osteomyelitis all bone inflammations due to microbic infection, whether the disease begins in the marrow, the spongiosa, the cortex, or the periosteum. Periostitis albuminosa, etc., he calls osteomyelitis albuminosa, etc. He observes that the infection can reach the bone through the skin, but in such cases there is always a furuncle or caruncle preceding the osteomyelitis. Inasmuch as this is often produced by suppurative skin-diseases or scratching the skin, a lack of cleanliness plays a more important rôle than had previously been supposed.

In the treatment of this condition he recommends the early chiselling out of the diseased bone-marrow. The modern operation dates back to 1881, since when Küster has operated upon twenty-four cases. Of these, fourteen were treated in the first two weeks of the disease; nine healed without fistula, five with fistula, and none died. In the third week of the disease three were operated upon, of which two died, and one was discharged with a fistula. In the fourth week

three were operated upon, of which two were completely cured, and one discharged with a fistula. During the fifth to the seventh week of the disease four were operated upon; of these, two died, one was discharged with fistula, and one with ankylosis. As far as conclusions may be drawn from such a small number of cases, it would seem that by far the most favorable time for operation is the first two weeks. The results for the third week are very unfavorable; and in the fourth week the cases do considerably better, though these were milder cases. From that time on the prognosis becomes poorer.

Küster has repeatedly observed that when the bone is cut down upon immediately after the appearance of very acute local symptoms, only a bloody infiltration of the bone or a very small pus focus is found. After chiselling out this area the wound heals very quickly. The more extensive the purulent infiltration, the more uncertain is the result of operation, both with regard to the danger to life and the probability of curing the disease. For this reason he favors operation as soon as the diagnosis is established, which is no difficult matter in the majority of cases, and especially in the osteomyelitis of the long bones. In cases of very extensive disease Küster does not simply chisel out the diseased bone, but performs the osteoplastic operation of Lücke.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, xxiii Kongress, 1894.

VI. The Early Operative Treatment of Osteomyelitis.

By Dr. SCHEDE (Hamburg). In the discussion provoked by the paper of Karewski on the abortive treatment of osteomyelitis, Schede observed that after an experience with some forty cases at Friedrichshain he has concluded that by an early opening of the abscess and marrow-cavity he could satisfactorily cope with the disease. His experience in Hamburg has corroborated this view.

Within the last fourteen years he has had at Hamburg 155 cases. These he divided into (1) those with severe general disease, in which the osteomyelitis is not the most important condition; and (2) those in which the local disease is the most prominent.

The cases of the first group came to the hospital early. At the operation the medulla was found congested and often suppurating. After two or three days the patients died, and at the autopsies abscesses were found in the internal organs. These were the pictures of severe septicopyæmia. It does not make any difference whether the bone is chiselled out or not. In fact, Schede has observed that the results are worse when the bone is chiselled than when the abscess is simply incised. In the cases which did not terminate fatally the fever continued after the cutting out of the bone on account of the severe general infection.

Good results can be obtained in the cases of the second group by an early bone operation. As far as these cases are concerned Schede agrees with Küster and Karewski on the value of early operation.

Out of 155 cases he has lost thirty-three. That is a mortality of 20 per cent. He regards the most dangerous localization of acute osteomyelitis that which occurs in the lower jaw. Four out of eleven such cases died. The osteomyelitis mandibulæ often follows the extraction of a tooth. It is always a question in these cases whether the osteomyelitis is a result of the extraction or whether it was the osteomyelitis that drove the patient to the dentist. Osteomyelitis of the pelvis he also regards as very serious.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VII. Osteochondritis Desiccans. By Dr. E. STAFFEL (Chemnitz). Staffel demonstrated before the surgical congress a preparation of osteochondritis desiccans of the shoulder which occurred in a laboring man, forty years of age. The patient, who was an especially strong man, received a blow against the hand of the outstretched arm so that it was transmitted to the shoulder. He immediately felt something snap in the shoulder-joint, and felt some pain, though he was able to continue at his work the rest of the day. From that time on the shoulder gradually enlarged. There was no increase of temperature during fourteen days of observation in the hospital. Eleven weeks after the injury there was a very considerable hydrops

articuli, and a loud crepitation with every movement. The arm was entirely useless. The joint was incised by the incision of Hueter, and 300 cubic centimetres of clear fluid evacuated. The larger part of the head of the humerus was absent. There was no trace of it in the joint cavity. The surface from which the head had been separated was perfectly smooth and firm, and was scattered over with little tabs. These were composed of connective tissue containing a few cartilage cells.

The remainder of the head of the humerus was resected, and the wounds healed. The arm can now be elevated twenty degrees above the horizontal, and the patient has resumed heavy labor.

This case is very similar to one reported by Riedel before the congress in 1890, in which the hip-joint was involved.

That this is not a case of traumatic incomplete fracture of the head with subsequent absorption of the dislocated fragment is evident from the fact that the patient was able to continue with his heavy labor for the whole of the day, after the accident.

Similar defects of the head of the humerus have been described by Kramer¹ and by Kupfer.²—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

VIII. Treatment of Congenital Bone Defects in the Forearm and Leg. By Dr. RINCHEVAL (Cologne). Professor Bardenheuer two years ago presented a new method for the operative treatment of these deformities. His operation in the forearm consisted in replacing the defect, at least at its lower part, with bone, and thereby permanently correcting the deformed position of the hand.

The operation is performed as follows: By a longitudinal incision the distal end of the ulna and the carpus are exposed, and the first isolated from its attachments. The ulna is then split through its middle into a radial and an ulnar section. These are separated by

¹ Berliner klinische Wochenschrift, 1882, No. 2.

² Chirurgenkongress, 1882.

allowing the carpal bones to come up between them. By means of a nail through each side, the ends are fixed to the carpus. A plaster bandage is applied, and left on for four or five weeks.

This operation is easily carried out. It has been done three times by Bardenheuer,—twice for congenital absence of the radius in an eighteen-months-old child and in a seven-weeks-old baby, and once in a ten-year-old boy, whose radius had been removed at its lower part for caries, leaving the hand in a position of varus.

The results in all three cases were good, both from a functional and cosmetic point of view. In all cases the deformity was permanently corrected. The movability of the hand was almost normal. There was no disturbance in the longitudinal growth of the bone. In the first case operated upon there was a very pronounced growth of the deformed extremity a year after the operation.

The same principle may be adopted in the treatment of other defects. In cases of congenital defect of the tibia or fibula the same operation has been done once in each. The best result was obtained in the fibular defect.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

IX. The Treatment of Typical Fractures of the Lower Extremity of the Radius. By Dr. FERD. PETERSEN (Kiel). In the "festschrift" in honor of Esmarch's seventieth birthday Petersen described a simple method for the treatment of fractures of the lower extremity of the radius. The forearm nearly as far forward as the fracture rests in a sling, while the hand, in ulno-volar flexion, hangs over the edge of the cloth. This position of the hand is directly contrary to that usually employed. The treatment must, of course, be preceded by a thorough reduction of the deformity. The method was tried on a colleague. After twenty days he was able to use the injured arm in driving. Superficial examination showed nothing abnormal at the seat of fracture. More thorough examination revealed a very small ridge at the line of fracture. The arm is as useful as ever.

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A number of cases treated by this method showed that the patients were able to resume work after from one to three weeks. The conclusions reached are,—

(1) The hanging of the hand over the edge of a sling suffices to keep the bones in position.

(2) The seat of the fracture is always before the eye, and any change can be immediately detected.

(3) The callus can develop freely, and the moderate amount of congestion facilitates consolidation and hastens healing.

(4) The possibility of active and passive movements and massage of the hand and fingers is a final advantage of this mode of treatment.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

X. Resection of the Ilium for Acute Osteomyelitis.

By J. A. VON BERGMANN (Riga). The author has tried the operation recommended by the French for resecting the diaphysis in acute osteomyelitis. In an osteomyelitis of the tibia he only chiselled out the entire diaphysis, though there seemed to be sufficient indication for a total resection. Notwithstanding the broad opening, suppuration took place in the knee and ankle-joints, and the leg had to be amputated in the thigh, which might have been avoided had a total resection of the diaphysis been done at once.

Diffuse softening of the spongy ends of the diaphysis of the marrow bones, especially when the spongiosa is infiltrated with miliary abscesses, and extensive separation of the periosteum, are urgent indications for total resection of the diaphysis. The same conditions hold true with the flat bones.

Of the thirty-five cases of osteomyelitis of the ilium, which are in the literature, but eleven were cured. In six cases the result is not known, and eighteen died.

When the distinction of Ollier is made, which classifies osteomyelitis of the ilium with paracetabular localization as distinct from that with localization in the peripheral parts of the bone, out of the

eleven cured cases nine belong to the latter category. Of the six cases with unknown results two had a paracetabular localization; while out of the eighteen fatal cases in fifteen the disease was localized about the acetabulum.

Bergmann is of the opinion that the above paracetabular cases were not treated radically enough. He has cured four out of seven cases of osteomyelitis of the ilium by partial resection of larger or smaller segments of the bone.

One case died after a partial resection of the ilium. Two cases were treated by total resection of the ilium, and healed with good functional results.

A sixteen-year-old boy presented the following history: He was seized with pain in the groin and fever. Three weeks later he was received at the hospital. He was weak, and had a temperature of 39.5° C. The left knee was flexed, thigh rotated outward and abducted and fixed at an angle of flexion at 160° . Passive rotation of the hip showed the joint to be smooth. Swelling was present in the entire internal iliac fossa as far down as the groin. Questionable fluctuation. A vertical incision was made near the spina ossis ilii anterior. The bone was exposed, and the periosteum easily shoved aside. In the bone scattered foci were found in the softened and hyperæmic spongiosa. These contained no pus. A hole, several centimetres in diameter was trephined through the thickness of the wing of the bone. An incision was made over this, and a tampon for drainage of the iliac fossa introduced from without. An osteomyelitic focus was laid open in the larger trochanter, which contained about one drop of pus. At first the temperature declined. The leg was more freely movable. The general condition of the patient did not much improve. Decubitus occurred over the sacrum. Two weeks after this a large abscess opened in the internal iliac fossa. The temperature declined, and then again ascended.

Five weeks later an incision was made parallel to the crest of the ilium, and a strip of bone the width of the hand was turned down. The bone incisions showed the wing of the ilium to be sound, but

that the disease was below. The diseased ilium was easily separated in the hip-joint from the ischium and pubis. The head of the femur, which was intact, lay free in the wound. A tampon of gauze was introduced, and the large flap of bone and soft parts was sutured to the crest of the ilium.

After the patient had recovered from an erysipelas, through which he passed, he was finally discharged from the clinic with but a moderate limitation in the movements of the hip-joint. Later on the movements in the hip became freer, and he became strong and well.

Another case was that of a girl, six and a half years old, who fell upon the right hip. A few days later she developed headache, fever, and pain in the back of the hip. She was received in the hospital two weeks later. She was pale and emaciated, and distinct fluctuation could be made out on both the outer and inner sides of the ilium. An incision was made just below the crest throughout its whole length, and the bone chiselled through. The periosteum was found separated from the bone by pus. The lower epiphysis was easily separated without opening the joint, and thus the ilium was resected. The wound was not sutured, but the flap of soft parts and periosteum was brought up to the crest, and the anterior and posterior angles of the wound tamponned with gauze. Five weeks later the patient was discharged. The scar was depressed, but there was already some regeneration of bone, and she was able to run about without difficulty.

Bergmann remarks that in 1845 Larghi in the same manner operated for a total sequestrum of the wing of the ilium.

Technically the operation is not difficult. The conditions for regeneration of the bone are very good. The two surfaces of periosteum which lie against one another have formed between them a very thin layer of bone, which fully compensates for the loss.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

XI. Total Resection of the Hip-Joint. By Dr. BARDENHEUER (Cologne). Bardenheuer presented four patients upon whom he had done this operation. In three cases a total resection of the acetabulum and in one case a partial resection of the same was done. In three cases a total resection of the upper end of femur, and in one only a concentric resection of the head was done.

The author showed the advantages of the method of fixing the leg at an angle of three-fourths of a right angle, and laid especial stress upon the importance of removing all the diseased bone from the acetabulum. By this means a complete cure without fistula can be almost always effected. The functional result is a good one. Ankylosis is the result.

The patients step upon the flat of the foot without a lift, have a firm tread, do not waddle, and are able to walk long distances with comfort.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

XII. Pathologico-Anatomical Demonstration of the Operation for Congenital Dislocation of the Hip. By Dr. HOFFA (Würzburg). Hoffa demonstrated the pelvis of a child three years old upon which, several months before, he had performed a double-sided operation for congenital dislocation of the hip. After complete healing of the wounds, the child had developed diphtheria and died. The preparation showed that a good joint had formed, the new acetabulum had become covered with a complete layer of hyaline cartilage, whereas at the time of operation it was soft and spongy bone.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

XIII. Flexure of the Neck of the Femur. By Dr. HOFMEISTER (Tübingen). This disease, which was first described by Ernst Müller in 1888, has been found in Bruns's clinic to be not so rare a condition as had been hitherto supposed. Hofmeister has been able to add thirty-three new cases to Müller's original four. Out of

forty-seven cases of genu valgum examined by him during the past five years were twenty-two cases of curvature of the femoral neck.

The disease begins insidiously with pain in the hip which may radiate to the knee. At first the pain appears only after long walking or standing. Often all that the patient notices is that he becomes easily tired. The trouble may be so great that the patient has to go to bed.

The disease occurs either in early childhood or, more frequently, at the time of puberty, as is the case with genu valgum infantum and adolescentium.

The objective signs are a more or less pronounced limp and usually an unusually prominent trochanter. The limp is due to an actual shortening of the leg, measured from the spine to the malleolus. The trochanter is elevated one and a half to seven centimetres.

Usually there is a very evident atrophy of the thigh muscles of the diseased side.

In all cases there is a marked limitation of abduction, and sometimes it is entirely checked. Adduction is usually free. In the great majority of cases the thigh is rotated outward. Inward rotation is limited or impossible, but outward rotation is, as a rule, free, and can be carried beyond the normal. Flexion can be carried farthest when combined with outward rotation.

In double-sided cases the signs are very characteristic. The patient can kneel only when the legs are crossed; the act of bowing is performed with difficulty; and the legs cannot be closed in sitting. The patient usually has a large skeleton with insufficient muscular development, and there is but seldom a trace of earlier rachitis.

The anatomical explanation of the changes of form and disturbances of motion, which was first made by Müller, and later described by Lauenstein and Hoffa, rests in a bending downward of the neck of the femur. The outward rotation is explained by a simultaneous backward bending of the neck.

In consideration of the deviation in the direction of adduction the designation "*coxa vara*" seems especially applicable to this disease.

Etiologically the weight and the muscular tension of the body upon the neck of a femur, weakened by rachitis or the so-called "late rachitis" of Mikulicz, are answerable for the disease.

Differential diagnosis can be established by careful examination. The outward rotation in coxa vara is not combined with abduction as in coxitis incipiens. The relatively mild subjective symptoms are in no wise in proportion to those of a coxitis, which presents equally severe objective symptoms due to a dislocation upward of the acetabulum.

The treatment consists in strengthening the bone by the use of phosphorus, massage, etc. It should also be protected from further pressure. In severe double-sided cases subtrochanteric osteotomy comes into consideration. Resection is scarcely justifiable.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

XIV. Eighteen Exarticulations at the Knee. By Dr. HABS (Magdeburg). The eighteen cases were all cured. The indications for amputation were three sarcomata, one gangrene after extirpation of a popliteal aneurism, one chronic osteomyelitis of the tibia, and thirteen cases of traumatism of the leg.

The operation usually done was that with the formation of a large anterior flap. This flap contained the patella. The capsule and synovialis were not removed.

These patients were able to bear the weight of the body in walking directly upon the end of the stump, and the distribution of the weight did not have to be made over the surface of the thigh by a conical socket. Patients which were operated upon during the period of growth in later years had femora of equal lengths.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXIII Kongress, 1894.

JAMES P. WARBASSE (Brooklyn).

REVIEWS OF BOOKS.

A MANUAL OF MODERN SURGERY, GENERAL AND OPERATIVE. By JOHN CHALMERS DA COSTA, M.D., Demonstrator of Surgery, Jefferson Medical College; Chief Assistant Surgeon, Jefferson Medical College Hospital, etc. Small 8vo, pp. 809. Philadelphia: W. B. Saunders, 1894.

This is a very attractive little book. It is hardly more than one-third the size of the American Text-Book, and about one-sixth the size of Agnew's Surgery, but it is proportionately larger than the little remembrancers and outlines of the subject by still other authors. By excluding obsolete and unessential methods, and omitting any attempt to exploit fanciful theories or indefensible hypotheses, the author has sought to attain the happy medium between prolixity and meagreness. Whether or not he has succeeded in his effort, each reader must judge for himself in the light of his own necessities. He certainly has produced a very clear and concise treatise in a very charming style.

The apology which he makes for opening the book with a section on bacteriology is entirely superfluous. In the present state of medical science an acquaintance with bacteriology is an absolute essential to a proper comprehension of surgical pathology. Dr. Da Costa's brief article on the subject is noticeable for its clearness,—the most dense of readers could not fail to understand it at once.

It is not so easy to understand, however, why he should have relegated his short section on Asepsis and Antisepsis to the end of the book. A chapter treating of facts, upon which the entire superstructure of modern operative work is founded, would logically have preceded the consideration of all operative procedures. The section in itself is excellent, notwithstanding its anomalous position, tersely dis-

cussing the applicability of aseptic and antiseptic precautions, outlining the preparations for operation, and considering the various operative materials.

About one-fourth of the book is occupied with fractures and dislocations. He quite properly ignores the treatment of fractures involving the elbow-joint with the forearm extended, advising immobilization with the joint at the right angle. He does not recognize the importance of the periosteal pseudo-ligament in the pathology of Colles' fracture, and he recommends the Bond splint for its treatment; the statement at the end of the section that "some surgeons dress Colles's fracture with a band of adhesive plaster around the wrist, and support the extremity in a sling" is an encouraging gleam of light, however.

Among the operative sections of the work, that devoted to Diseases and Injuries of the Head is particularly noticeable on account of its up-to-date character. The instruction in methods of cerebral localization is clear and definite, and the scope of his remarks on cranial surgery is comprehensive; intracranial tumors and the operative treatment of epilepsy receive careful consideration.

His statement in connection with intestinal obstruction, that "puncture of the intestine with an aseptic hypodermatic needle introduced obliquely will relieve gaseous distention," will hardly stand the test of practical application. His teachings on abdominal surgery in general are good, however, and present the latest accepted views on the subject.

A detailed examination of the entire work only confirms the favorable impression given at first sight, and Dr. Da Costa is to be congratulated upon having produced a work of distinct surgical utility.

The publisher's work has been done nearly as well as that of the author, for the mechanical execution is excellent, although the binding is a little too light for the size of the book; the type is large and clear, the paper is excellent, and the illustrations are well chosen. But the index is difficult to find, on account of the presence at the

back of the book of a catalogue of the works issued by the publisher, printed on the same paper as the body of the book. Far from being objectionable in itself the catalogue may often be very useful in rendering easily accessible a list of the other publications of the publisher of this work, but it should have been so arranged as not to interfere with the readiness with which the index can be consulted. There are several ways in which this might be accomplished, the most effective, perhaps, being the use for the catalogue of colored paper.

JAMES E. PILCHER.

THE PROCEEDINGS OF THE FOURTH ANNUAL MEETING OF THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES. 8vo, 800 pages ; illustrated. St. Louis : Buxton & Skinner Stationery Co., 1894.

The fact that this large volume represents the work accomplished at a single annual meeting argues well for the activity of the Association of Military Surgeons. It will doubtless be a matter of surprise to many members of the medical profession that "in these piping times of peace" this especial department of medicine should be the scene of so much virile activity ; they will be interested too, for most of the papers here collated are valuable to students of history, of law, of mechanics, and even to the casual reader. All branches of the military service are represented, and the National Guard divides the honors with the "Regulars."

The first eighty pages are devoted to the secretary's report of the meeting held at Washington on the 1st, 2d, and 3d of May, 1894. Reports of committees, the discussion of the papers read, lists of officers, committees, and members, and the constitution and by-laws of the Association are included, so that the reader is able to form an excellent idea of the aims of the organization, and also of the members themselves.

Nearly two score of articles are published ; the standard of excellence is high, and most of the articles bear witness to extensive

original research. Attention can be especially directed to but a few articles from among so large a number. First of all in position and in general interest is the president's 'annual Address, "Abdominal Surgery upon the Battle-Field," by Nicholas Senn, Surgeon-General of the National Guard of Illinois. Dr. Senn requires no introduction to readers, and it goes without saying that his contribution, illustrated as it is with photographs and replete with practical suggestions, is a valuable one.

The first day was devoted to a symposium on transportation of the sick and wounded. An introductory article by Major Smart treats the subject from the stand-point of an historian. Following this the litter, the ambulance, the travois, the railway and ship hammock litter are each the subject of papers of value to any one who may be called upon to superintend the transportation of invalids in a place remote from the usual conveniences of civilization. As an addendum to this series Captain Perley describes an ingeniously devised "Field Hospital Kitchen Wagon" for the purpose of sterilizing dressings or of cooking food at the dressing stations or on the march.

Military medicine, surgery, and hygiene formed the general subjects for the second day's discussion. The article by Lieutenant-Colonel Almy upon "The Red Cross" is worthy of careful consideration by all classes of society. The Treaty of Geneva is given in full, and this will do something towards enlightening the ignorance so prevalent upon this subject, even among members of military organizations. The danger of the abuse of the insignia by unauthorized persons has been often dwelt upon by "that noble woman who has done more for the Red Cross than any one in America,—Clara Barton;"—and Dr. Almy vigorously supports her position. "It is bad enough to have a drug firm use our badge upon absorbent cotton and catgut ligatures and our 'mark on its medical stores,' or for a brand of beef extract to be apparently sanctioned by the red cross, but when it comes to Red Cross Cigars and Cigarettes, Red Cross Brandy and Whiskey, Red Cross Washing Machines, Red Cross Playing Cards, Red Cross Soap, Red Cross Churns, Red Cross Dog Collars, etc., it would seem

that it were time to stop the use of the cross as a trade-mark. Efforts have already been made to make this the subject of legal enactment, and the law should stand so that the 'Red Cross' may be a sign which will mean what it was intended that it should mean, and that under the folds of its flag will be found only those doing work in the interests of humanity, and hereafter the Red Cross shall not only protect but be protected."

Another subject of general interest to the inhabitants of those States which grant pensions to members of the National Guard who are injured in actual service is considered by Captain James E. Pilcher, under the title of "The Place of Physical Training in the Military service." The importance of a good physique is now generally recognized, and it is to be hoped that the author will supplement his paper at some future time by publishing specific and ample directions as to the best methods by which a high standard of physical development may be secured in large bodies of men.

"Pernicious Fever," "Penetrating Wounds of the Abdomen," "Gunshot Wounds of the Extremities," "The Germicidal Value of Trikresol," and "The Action of Rattlesnake Venom upon the Bactericidal Power of the Blood Serum" were the most important papers of the afternoon session.

Still more limited to military topics are the papers of the third day. The effects of the small-calibre rifle, and of that most deadly of all modern projectiles, the Frankfort Arsenal shrapnel, are described, and the influence of these new factors in warfare upon the field work of the hospital corps forms the basis of a number of papers. Two others are devoted to the personal equipment of the sanitary soldier, and the training of the medical officer. A series of five articles by Major John Van R. Hoff, U. S. A., describes the sanitary organization in the armies of France, Germany, Austro-Hungary, Great Britain, and the United States. Even more elaborate than these is the official report of the author's observations upon the Medical Department of the British Army, by Lieutenant-Colonel Alfred A. Woodhull, U. S. A. The last-mentioned paper was submitted to the Sec-

retary of War as a result of official orders, and the ripe personal experience of the writer combined with the unusual opportunities for observation afforded to him have aided in the production of the most extensive, complete, and accurate article presented at the meeting.

There is no table of contents, and this glaring defect, combined with the fact that the order in which the papers appear upon the programme is not adhered to in the book, seriously impairs the value of the volume as a means of reference. There is an index given, but this too is so meagre as to be of little assistance to the reader.

" When war is rife, and danger nigh,
 ' God and the soldier' is the people's cry ;
When peace is made, and all things righted,
 God's forgot, and the soldier slighted."

No truer words were ever written than these of the rhyming soldier of Delhi, and particularly are they true of the medical department. In all grades of society we find a disposition to ignore the value of the medical profession until sickness or accident brings them into close and necessary contact with its members; then they are compelled to appreciate their value. If this be true in civil life, how much more so is it in the army, in times of peace, when no heed is ever given to the warning from military sanitarians to "prepare for war." Major Hoff, from whose article this quotation is taken, appears to be something of a pessimist, for whatever may with justice be said of medical departments in general, no one, after reading this volume, including as it does the most recent advances in surgery and medicine, can believe that the dry rot of inanition is in any immediate danger of affecting the military surgeons of our own country.

H. P. DE FOREST (Brooklyn).

LOCAL ANÆSTHETICS AND COCAINE ANALGESIA; THEIR USES AND LIMITATIONS. By THOMAS H. MANLEY, A.M., M.D. New York: J. H. Chambers & Co., 1894.

In this work the author begins with observations upon anæsthetics in general and the various methods of inducing local analgesia. Part

II of the work is devoted to cocaine anæsthesia. All of the various operations in which this method of producing insensibility is employed are illustrated by clinical cases in the experience of the author. Besides the use of this drug in the superficial plastic operations and in minor surgery, many cases are reported in which it was used in operations for strangulated hernia, in adult tracheotomy, in suprapubic cystotomy, and in hæmorrhoidal operations.

The author reports thirteen cases of strangulated hernia operated upon under cocaine anæsthesia.

The technique of the use of the drug is well illustrated, and the author shows a practical familiarity with its use. This little volume is well worth perusing, and it is to be hoped that it may save many patients from general anæsthesia in cases in which a local application would answer quite as well.

It might be remarked that the author is given to diverging from his subject and dwelling upon features of his cases which have nothing to do with the subject under discussion.

JAMES P. WARBASSE.

DISEASES OF THE BREAST. Their Pathology and Treatment, with Special Reference to Cancer. By W. ROGER WILLIAMS, F.R.C.S. 8vo, pp. 572. London: John Ball & Sons, 1894.

This is an extremely satisfactory book, clear and comprehensive in its statements of facts, and logical in its deductions. It displays extensive research and wide acquaintance with the literature of its subject, together with abundant personal clinical observation. The first six chapters are devoted to matters of ontogeny, morphology, histology, mammary variations, and mammary hypertrophy. These chapters contain much that is important, much that is curious and interesting, and some things that are speculative. Perhaps of the highest practical importance is the section on paramammary neoplasms arising from supernumerary mammary structures. This section begins by calling attention to the theory of Cohnheim, that in

the development of every part of the body portions of the matrix become sequestered, and remain disseminated in the adjacent tissues, to develop in after years into neoplasms. In support of the correctness of this theory, the author says that by modern research sequestered fragments of this kind have now been shown to exist in every part of the body that has been specially examined for them, and, moreover, that paramammary sequestrations are of common occurrence, and that from them neoplasms—identical in structure with mammary neoplasms—frequently arise. A number of cases, gathered from literature, are given in illustration of the truth of this statement; but of more importance are the results of his own special investigations. He says that of fifty cases of fibro-adenoma of the mammary region, consecutively under his observation, he had found seven (14 per cent.) which had originated in supernumerary mammary structures, quite outside the normal *mammæ*. Brief abstracts of these cases are given by him. Also of 132 cases of cancer of the mammary region in women, consecutively under his observation, thirteen (9.8 per cent.) originated in supernumerary mammary structures, quite outside the normal *mammæ*, some cases being excluded in which, although it seemed almost certain that the disease originated outside the mamma, he could not be quite sure of it. Most of the alleged cases of primary cancer of the axillary glands belong to this category.

Chapter VII takes up the subject of neoplasms of the breast, and by far the greater part of the remaining pages of the book are devoted to the various phases of this subject.

Of interest are the views of the author on the pathogeny of cancer. He rejects *in toto* the idea of the existence of a cancer microbe, and claims that the agency of micro-organisms is no more necessary to account for the genesis of cancer than it is to account for the genesis of a tooth or a hair. Nor does he admit that chronic inflammatory lesions are the necessary antecedents of cancer, although he points out that parts that have been subjected to repeated irritations of long duration and moderate intensity are more apt to take on neo-

plastic action than they otherwise would have been. Inflammatory pseudo-plasms, he points out, always have the same indifferent structure, no matter in what part of the body they arise, while perhaps the most striking feature about cancerous growths is the wide morphological differences that obtain between them according to the localities whence they originate. The great resemblance, always noticeable between primary and secondary cancerous growths, is a phenomenon which is absolutely unaccountable on the basis of inflammation and micro-organisms, and clearly argues that the disease centres in the epithelial cells themselves.

The author's view is expressed thus: "The process by which cancers and other neoplasms arise may be regarded as a kind of abnormal generation, the tumor being the result of this modified, super-induced repetition of the developmental process, and its qualities the result of the grade of organization attained," the genesis of cancer being a phenomenon of the same order as discontinuous growth in general.

The question of the origin of malignant from non-malignant neoplasms is the subject of a thorough study also. He says that "since innocent neoplasms may inflame, suppurate, ulcerate, necrose, and degenerate just like physiological parts of the body, it seems not unreasonable to suppose that they may also become the seat of malignant disease." After reviewing the clinical facts which he has been able to gather bearing on the question, he came to the conclusion that, while the possibility of benign neoplasms taking on malignant characters later in life is undeniable, they are not specially prone to do this, and that non-malignant mammary neoplasms are less liable to originate cancer than are the glandular elements of the breast itself.

Chapters IX and X, devoted respectively to the morphology and the general pathology of mammary cancer, are among the best in the book, and are worthy of repeated reading and close study, being the foundation as they are of all rational and successful treatment. In particular the paragraphs treating upon local dissemination, lymph-

gland dissemination, and general dissemination are worthy of mention. The section devoted to the differential diagnosis of mammary cancer is open to the criticism that it does not sufficiently emphasize the fact that, in any case where a doubt is possible as to the character of a tumor of the breast, the benefit of the doubt should be given to malignancy, and early extirpation be done. It is certainly better that many breasts with innocent tumors should be sacrificed rather than that one cancer should be permitted to disseminate itself while the development of unmistakable signs of its character is being waited for.

A more certain sound is, however, given forth in the chapter on the treatment of cancer. This chapter begins with the statement that pathological doctrine points emphatically to the possibility of cancer being curable by sufficiently thorough operations. Then in a masterly and convincing manner are marshalled the anatomico-pathological data by which the thoroughness of an operation is to be judged. Mammary cancer progresses by the continuous centrifugal extension of epithelial ingrowing processes, which spread most rapidly in the directions of least resistance, which are usually along the adjacent lymphatics and perivascular sheaths. The paramammary adipose tissue, the skin overlying the vicinity of the tumor, and the sheath of the pectoral muscle are quickly invaded. The gland in its entirety everywhere shows signs of excessive proliferative activity, and is diseased. Supernumerary mammary structures are so frequent as to always be suspected, and, since they sometimes originate recurrences, must be removed with the breast itself. Cancer fragments have great tenacity of life and proliferative power; hence, care must be taken to avoid cutting through cancerous tissue lest cancer elements be disseminated in the operative wound to become fresh centres of disease. The axillary glands early become affected and in the immense majority of cases, even in cases in which careful clinical examination before removal had failed to detect any morbid condition in them, examination, subsequent to removal, has shown them to be invaded by the disease. A thorough operation, therefore, must involve the removal

en masse of the breast and considerable paramammary adipose tissue, of the overlying skin and of the underlying pectoral muscle, and of the axillary glands with the fatty tissue in which they are embedded, including the bridge of tissue which connects this part and the breast. The manner in which this may be done is described, but the author is less happy in this part of his work than in that which may be termed the strictly scientific portion of his treatise. It is to be regretted that the author could not have had the advantage of a knowledge of the method and the results of Halsted, as given in his recent paper in the *ANNALS OF SURGERY* of November, 1894.

Villous duct cancers, cancer of the mammary integument, cancer of the male breast, and sarcoma of the breast are each treated of at length in following chapters. The non-malignant tumors are then taken up, including those of the axilla. A discussion of inflammatory and suppurative diseases of the breast follows in order. Mammary tuberculosis is quite fully described, and a brief mention of syphilitic and diphtheritic affections of the breast is given. The concluding chapter is devoted to traumata, neuroses, and minor surgery.

The book fulfils the promise of its title-page, to be a monograph on the pathology and treatment of diseases of the breast. It is beyond question the best presentation of the present condition of knowledge in its field that has appeared in the English language.

L. S. PILCHER.

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THE SURGICAL TREATMENT OF SPINA BIFIDA.¹

By HENRY O. MARCY, M.D.,

OF BOSTON, MASS.

THE surgery of to-day demands the revision of the dicta of yesterday upon many of the operative questions considered settled. Few have seemed more clearly determined than the negative to the interrogatory, Are the varying conditions usually classed under the general name of spina bifida amenable to surgical treatment? The experience of the generations appeared sufficient to determine against further experimental operative interference. However, an analysis of the cases reported points to the many fatal failures as incident to the one general cause, the septic infection of the wound. Sepsis *in loco* does not permit the primary closure of the wound, and non-closure means an undue loss of the cerebro-spinal fluid with the consequences which must follow in the changes supervening in the great nerve-centres. The septic infection usually extends rapidly along the spinal canal, and the result is disastrous.

What wonder all attempts at cure in the earlier period were almost necessarily followed by death! Are we in a condition, by methods at present at our command, to reverse the verdict as transmitted to us from the past, and which is still generally accepted? *A priori* reasoning would lead to the conclusion that art could supplement nature in her defective development. The simplest consideration of the subject in its varying phases presents a hernial tumor containing cerebro-spinal fluid; the opening through which the tumor escapes being caused by a defect in the bony support of the spinal canal and its envelopes.

The varying of the conditions, as well as location in the

¹ Read before the Southern Surgical and Gynæcological Association, November, 1894.

spinal column, causes great diversity in the size and shape of the protruding tumor.

The hydrostatic pressure is greatly increased the lower the opening in the canal, and, as a consequence, the greater the dilating force exercised upon the hernial envelopes when the patient is in an erect position.

Granting that the operation can be successfully performed, the liability of the return of the hernia diminishes the higher the vertebral opening. If the opening is in the lower part of the canal, can the soft parts be utilized so as effectually to prevent a return of the hernia? The limit and purpose of this paper hardly permit the discussion of some very interesting phases of the subject. Do we find the envelopes of the sac unimportant, allowing their removal without serious injury to the organism? Is it usual that important nerve filaments are distributed over the interior of the sac, and that their removal may inflict a permanent injury? Is paralysis of important nerve functions to follow?

Cerebral surgery has taught that, under proper care, the envelopes of the brain may be opened with comparatively little danger; even the great cerebral centres are invaded with a minimum of risk. Laminectomy may be undertaken with very little danger to life, and tumors of the spinal cord are considered within the domain of the surgeon. The reasons of advance in these directions are all found in the surgical skill applied under aseptic conditions. The skill itself, from either the anatomical or surgical stand-point, is very little, if any, more perfect than that which was exercised a generation ago. From the above, the inference is that the aseptic operation upon a spina bifida should not be especially dangerous.

Undertaken with a reasonable minimum of danger to life, is it possible to reform and reinforce the structures so as to effect a permanent cure?

I have felt for a long time that the essential features of the surgical treatment of spina bifida were the same as in the operation for the cure of hernia. The isolation and the removal of the sac (having first ascertained its contents) and the reinforcement of the structures in a way to prevent as far as possible the return

of the tumor. Although there may be a considerable variation in the pathological conditions found in operable cases of spina bifida, the one important consideration to be kept in mind is that the sac of the tumor is in direct continuity with the spinal canal, and that the fluid contained therein is in intimate relation with that surrounding the great cerebral centres. Undue loss of this fluid in the opening of the sac may result in sudden death, because of changes incident to the disturbed relations of the intracranial organs. On this account the head must be considerably lowered prior to the opening of the sac.

A free dissection is necessary, elliptical incisions being made upon either side, reserving ample lateral flaps to compensate for the retraction of the distended covering. It is wise to carry the dissection entirely to the base of the tumor before opening the sac, since, owing to the distention, the relation of the structures is more easily defined. Having placed the patient upon an inclined plane, the sac should now be emptied, and this is best effected by a trocar in order that the fluid may be somewhat slowly withdrawn, and thus the operator can observe the changes, if any occur, in the cerebral centres.

It is also a matter of interest to note the amount of fluid contained in the sac.

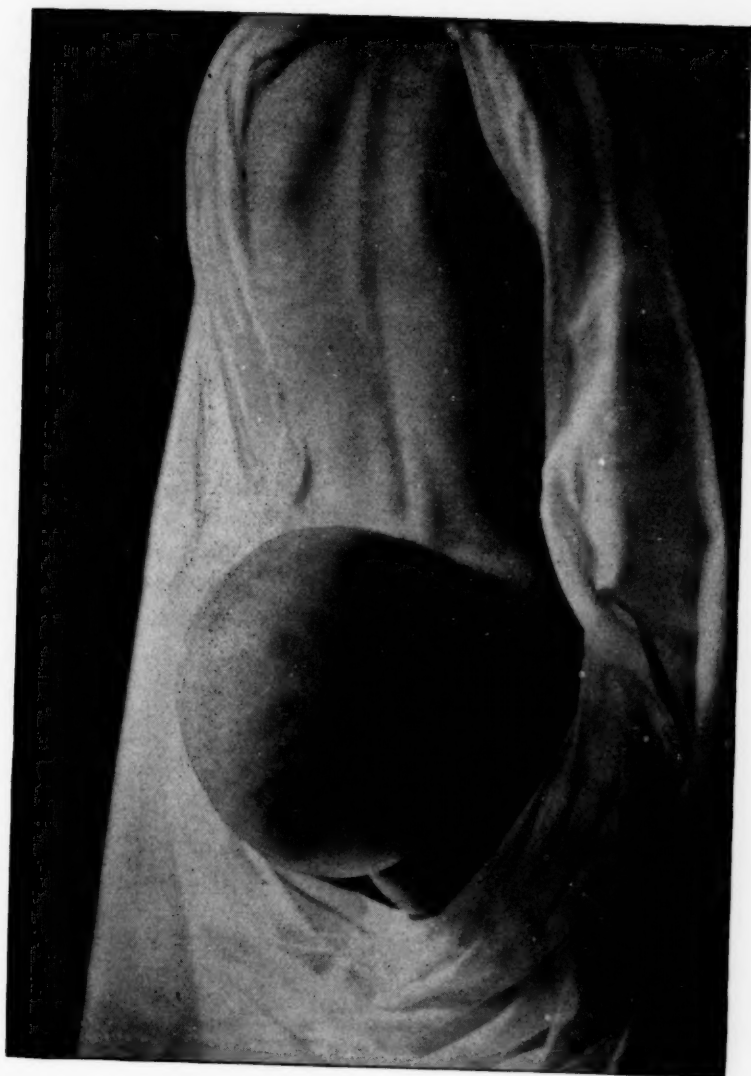
Owing to the fact that certain more or less important portions of the spinal cord are often spread out upon the inner wall of the sac, it is best to open the sac freely and dissect the same, if possible, for the purpose of returning any nerve filaments thus found within the spinal canal. This having been effected, the walls of the sac are carefully held by an assistant, in order that the base may be coapted by suturing. This is best accomplished by the use of a needle with eye near the point, so as to apply a double continuous suture which encloses the entire base of the tumor in even uniform compression, the stitches being subdivided as the operator judges advisable. It is well to remember that coaptation and compression sufficient to prevent the leakage of the fluid is all that is desired; force beyond this, applied to the parts enclosed, cuts off the circulation in the tissues and may lead to necrosis of even aseptic structures. A tendon suture is

greatly preferable to catgut, since it is much more slowly absorbed. An aseptic animal suture is important, since it is deeply buried and must remain in close approximation to very important structures.

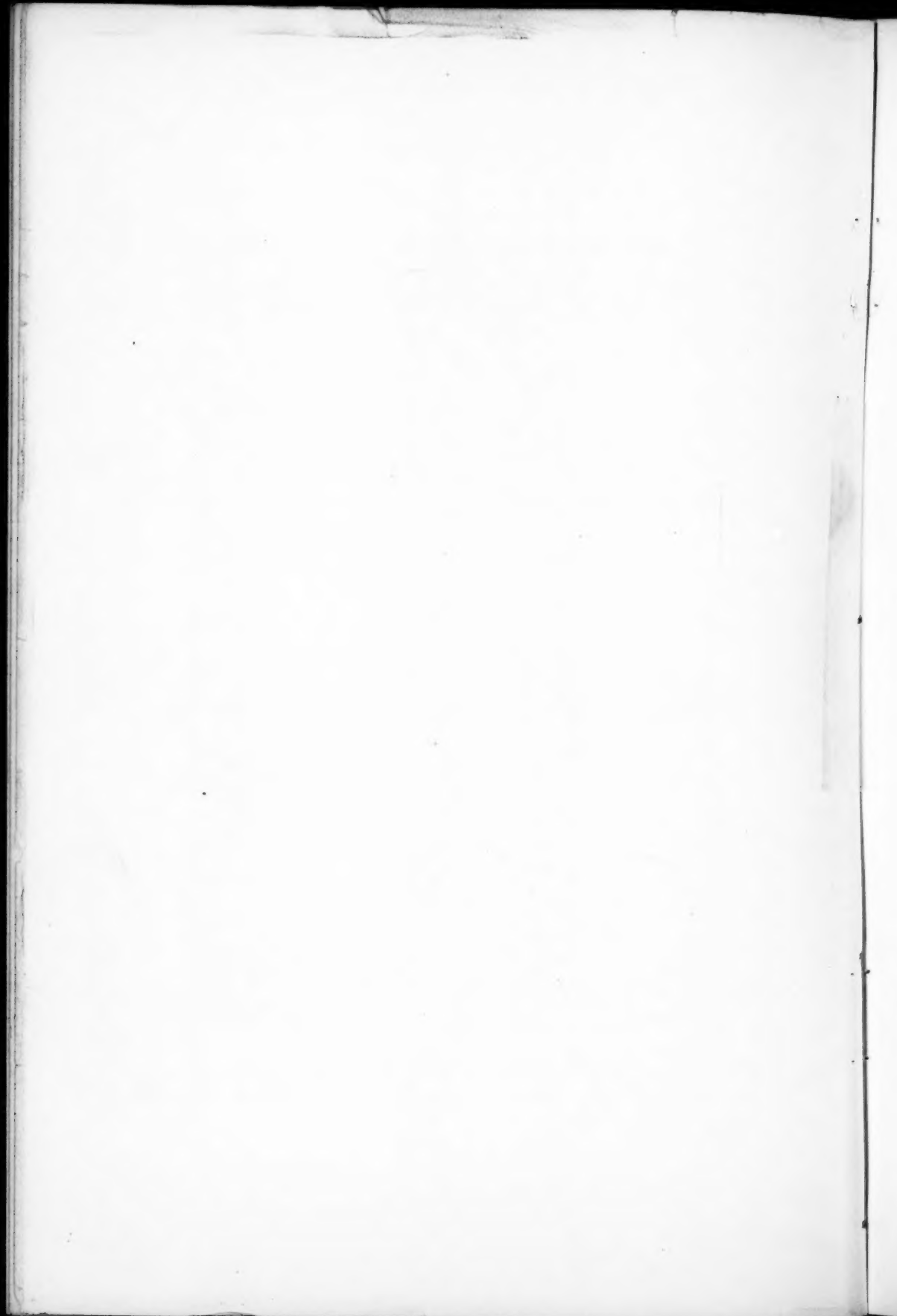
The sac is now cut away at about an half inch exterior to the line of suturing in order to allow sufficient tissue for intra-folding the divided edges, which is done by a parallel suture introduced from side to side. The stump thus sewed across, the next important step in the operation is to anchor it firmly for the permanent support of the reformed spinal canal and reconstruct over it as strong supporting structures as possible. To effect this, the stump is closed down upon either side to the strong fascia of the quadrati muscles. Efforts have been made for the planting of periosteum for the purpose of reforming the spinal arches of the vertebra, but with doubtful success. Generally the osseous structures are so wanting that it is very difficult to find the lateral arches and utilize them for any purpose. The more or less considerable superficial wound is now closed with buried animal sutures, the skin itself coapted in this way, and the wound sealed with iodoform collodion, reinforced with a few fibres of absorbent cotton. A wound so treated, if aseptic, must thus remain, and if non-infected primary union will supervene.

I am now fortunate in being able to report a typical illustrative case, to which I subjoin a brief history of the operation :

Miss B., aged eighteen; healthy family; normal development at birth, except a soft swelling under the skin in the lumbar region, the size of half an orange. This has steadily grown until the present, rather more rapidly of late. The patient has been in fairly good health, a little below the average in height, weight 115 pounds. Is intellectually very bright, vivacious, and fond of her books and music. For some years she has worn an elastic supporter, adjusted to the shape of the tumor and encircling the body. Tumor not sensitive to touch or compressible. Circumference in its largest part, twenty-nine inches; measurement in line of spine is nineteen inches; transverse, eighteen inches; nearly circular in shape. Wave impulse distinct, with the covering evidently very much thinned out upon the right side. She has slightly club-feet with indrawn toes, otherwise is



DR. MARCY'S CASE OF SPINA BIFIDA.



normally developed. Has consulted many surgeons, who have invariably advised against surgical interference.

I determined upon operation because of the increasing size and extreme thinness of the sac, believing rupture imminent. The patient gladly sought relief, as she was becoming morbidly sensitive on account of her deformity, and exercise was limited with an ever-increasing caution and fear.

Operation performed October 16, assisted by Dr. H. C. White, G. L. Amerman, and H. O. Marcy, Jr. Elliptical incisions were made through the skin upon the cyst-wall, and the flaps were dissected quite to the base upon either side, the pedicle being about three inches in diameter. Elevated the hips of the patient so that the spine was upon an angle of perhaps fifteen degrees before opening the sac. The tumor contained one gallon of perfectly clear, colorless fluid, which was drawn off by means of a trocar. Specific gravity of fluid 1.010. Slight trace of albumen. A little to the right of the median line the cauda equina was spread out upon the wall of the sac, perhaps two inches in width. This I carefully dissected and returned within the canal. The walls of the sac at its base were very much thicker than elsewhere. The opening was nearly three inches in length, through the two lower lumbar vertebræ. The base was closed carefully with a double continuous kangaroo tendon suture, and the sac was cut away. The cut edges were intrafolded by a continuous parallel suture taken from side to side. The base was then stitched carefully to the strong aponeurotic fascia of the quadrati muscles laterally. Then the wound, the size of a large dining-plate, was closed down with lines of running buried tendon sutures in order to leave no pockets or open spaces, and the skin brought into apposition with a buried suture, as in laparotomy, and sealed with iodoform collodion. A small drainage-tube was inserted in the lower angle of the wound, which was removed the second day. The union was entirely primary and the recovery rapid. For a day or two she complained of burning sensations in and twitchings of the feet. No cerebral disturbances. There was slight paralysis of the sphincters, which disappeared at the third week.

At the time of writing, November 9, patient is up and dressed. The cicatrix is firm and not tender. Only a slight line marks the place of incision. She has been kept for the most part in the horizontal position, that the hydrostatic pressure of the fluid

in the spinal canal may not dilate the consolidating structures.¹ I find no case reported where the tumor had developed to such an extraordinary size.

The subjoined operative cases have been found after a careful search of the medical literature extending through a very considerable period. It is very likely incomplete, but it shows that the operation was first intelligently advised and successfully executed by American surgeons. If ever operative measures become the rule in practice, they must be based upon aseptic principles; the resected parts closed and reinforced by buried animal sutures, preferably tendon, to be followed by primary union. Under these conditions I confidently await the verdict of the future.

I quote the first suggestions which I find as to the operative treatment of spina bifida from the work of Sir Charles Bell, published in 1791.²

"But if the opening between the spinous processes of the vertebræ with which it is always accompanied be not the *effect* of the disease, as it is commonly supposed to be, and if the want of support which this deficiency of bone must create to the membranes of the spinal marrow be the *cause* of serous effusions within these membranes, might not some advantage be derived from applying a ligature round the base of the tumor, not merely with a view to remove it, but also to draw the bottom of the cyst so closely together that it may act as a proper support to the parts beneath? Whether any benefit may be derived from it or not is no doubt very uncertain; but in a disease which we know will otherwise terminate fatally, we are warranted in proposing whatever can afford even the smallest chance of safety; so that I mean to attempt it in the first case of this kind that falls under my care."

Sir Astley Cooper reported two successful cases of spina bifida cured by repeated tapplings followed by compression.

Dr. A. Trowbridge,³ of Watertown, N. Y., so far as I have

¹ Patient was discharged from hospital at the end of the sixth week, wearing an elastic compression-pad when in the upright position. Improvement in every way rapid. Cicatrix firm and unyielding. She is resuming her studies, and with care is permitted to take short walks, rides, etc.—February 1, 1895.

² *A System of Surgery*, by Benjamin Bell, Vol. IV, p. 74.

³ *Boston Medical and Surgical Journal*, Vol. I, No. 48, January 23, 1829.

been able to find, was the first who attempted to put in practice the suggestion of the great Edinburgh surgeon.

His first case was a boy of eighteen months, otherwise healthy. "Tumor over lower cervical vertebræ, size of an egg, entirely covered with cellular substance. Small silver wire was put around base of swelling, passed through a canula, and brought moderately tight, so as to produce slight inflammation on the surface at its base. At the end of second day I passed scalpel on outer side, close to wire, divided and separated outer portion. A preternatural opening was perceptible between two lower cervical vertebræ into spinal canal. Discharge of fluid from small opening in centre. Wound completely healed and child cured."

His second case was a boy two and a half years old. Tumor over three lower cervical vertebræ, seven inches in circumference. Wire and canula placed on base. Ligature remained four days, then drawn tightly to prevent circulation. Nine days from first application cut away the tumor above ligature. Ligature came off, followed by the spouting of a wineglassful of turbid lymph, tinged with blood, from small opening in spinal canal. In four weeks the whole wound was cicatrized and sound.

His third case was a child four years of age. "Large tumor over sacrum and three lower lumbar vertebræ. At time of operation tumor was thirteen inches in circumference, seven inches at base. Incision through integuments, leaving enough to cover wound. A cavity was presented containing several cysts or sacs, resembling intestines, filled with fluid. Removed whole by dividing membranous attachments near the spinal muscles. Child recovered and remains well."

Dr. Brainard, of Chicago, appears to have been the first to practise the injection method with solutions of iodine, having published his results in 1848.

Morton revived the practice, and in Europe this procedure is called the Morton method. Tavignat, in 1844, reported a case of excision of the sac and suture of the wound. Death supervened from inflammation.

Dr. William Judkins¹ reported a case of spina bifida cured

¹ Western Medical Journal and Physical Sciences, Cincinnati, 1837.

by ligature. Tumor size of an egg in lower cervical vertebra. Child three months old. He ligated at first loosely, then tighter, and at last very tightly. Slough separated the tenth day. Cure remained two years later.

Dr. A. G. Purdy¹ reported a case of spina bifida upon which he operated in February, 1842.

The child was about a week old; tumor in lumbar region, size of a small orange with a neck about one inch in diameter. The surface was ulcerating. The sac was opened and the spinal cord was clearly seen. The integuments were carefully dissected to the neck and the sac excised. There was a slight oozing for some weeks. Paralysis of one leg followed, which did not entirely disappear until the third year. The cure was considered perfect.

Mr. W. B. Page² reported a case of a child twenty-one months old. Tumor in lower lumbar vertebræ. Spheroidal in shape, measuring seven inches in circumference and five at its base. Covered with skin. After repeated attempts at removal by constriction with the elastic ligature, the tumor was dissected to its base and the cyst ligated very tightly. The skin sloughed. The ligature came away on the sixth day, the cicatrix slowly contracted and remained firm. The cure was reported as complete.

Dr. L. A. Sayre,³ of New York, reported a case of spina bifida in a child two years of age. She had a fluctuating, pendulous tumor about the size of a hen's egg, with a small neck. It was situated over the sixth cervical vertebra. The sac was transfixed with a double ligature and ligated tightly. On the twenty-third day the ligatures came away, leaving the wound entirely healed. "Query, Was not my success owing entirely to the strangulation by the ligature, thereby cutting off all communication with the spinal canal, and in causing it to heal over, close to its origin, and thereby supplying the place of the bony arches?"

Dubourg⁴ reported a case of cure of spina bifida by the excision of the tumor and the compression of the base of the sac by hare-lip pin sutures.

Dr. J. C. Nott⁵ reported a case of spina bifida cured by excision.

¹ The Annalist, New York, 1846.

² Monthly for Medical Science, Edinburgh, 1847.

³ New York Journal of Medicine, 1849.

⁴ Gazette d'hôpital, Paris, 1849.

⁵ American Journal of the Medical Sciences, 1855.

Child one month old. Tumor in middle lumbar vertebra, size of an egg. "After the sac was removed, an opening into the spinal canal was exposed about the size of the end of the finger, and a tablespoonful of fluid escaped. Closed by pin and twisted suture. Wound sloughed and closed by granulations. Two months later the cure seemed complete."

Royer¹ reported a case of spina bifida located in the lower sacral region, where he excised the sac and sutured, followed by cure.

Dr. Elisha Huntington,² of Lowell, reported a case of spina bifida in a child six months old; otherwise healthy, except a slight varus of one foot. "The tumor hung like a pendulous polypus from over the vertebral column, and about on a line with the crest of the ilia. It had a peduncle, which was about a foot in length and about as large as the little finger, but enlarging somewhat just before it joined the body of the tumor. This last was nearly the size of the two fists." Immediately after the birth, as nearly as possible to its origin, a ligature was applied to the peduncle and the tumor was cut away. The ligature slipped and a nearly fatal hæmorrhage occurred. Recovery was rapid, and the child is strong with only an irregularity of surface to the feel.

Dr. J. B. S. Jackson examined and reported it as a very rare case of spina bifida. The cavity of the peduncle admitted a probe with difficulty. Specimen in Warren Museum, No. 852.

Dr. Henry G. Clarke,³ of Boston, reported a case of spina bifida in sacral region. Girl, seven years old; otherwise in perfect health. Operated on at Massachusetts General Hospital. About one pint of colorless fluid was evacuated by a trocar; specific gravity 1006. Needles armed with strong ligatures were thrust through the base and tied very tightly. Patient suffered very much. The tissues sloughed, and the fluid began to leak on the fourth day. Death occurred on the fifth day. The autopsy, made by Dr. J. B. S. Jackson, showed that the spinal cord was lost upon the inside of the sac, about two inches from the opening, and that at least a portion of it had been included in the ligatures.

Dr. Thomas Smith⁴ reports for Dr. Wilson, under date January, 1868, a case of cure by excision. Child about one month old. Tumor

¹ Bulletin Académie de médecine, Paris, 1855-56.

² Boston Medical and Surgical Journal, July, 1862.

³ Boston Medical and Surgical Journal, 1865.

⁴ Transactions Pathological Society, London, Vol. XIV.

several times aspirated. Five days before operation, he compressed the tumor by a steel clamp. Dissected and excised. "The cut edges of the spinal membranes were lightly touched with a red-hot knitting-needle to promote adhesions. Sutures were applied to the wound and pressure to the pedicle of the tumor. Child recovered from the operation without a bad symptom, and twenty days afterwards, the wound had entirely healed."

Dr. Smith remarks, "Surgically, this case is one of interest, having been the first operation of the kind that has terminated successfully in this country."

Rizzoli, of Bologna, operated in 1869 and again in 1871 upon spina bifida by the use of his specially devised clamp forceps. The compression was graduated so as to cut off slowly the circulation. The cures were complete with firm cicatrices.

Dr. James Weaver¹ presented a child for the inspection of the North Staffordshire Medical Society, upon whom he had operated the preceding June. The tumor was in the lumbar region, attached by ligamentous pedicle or band to space between last dorsal and first lumbar vertebræ. Pedicle two inches or more in length. He had punctured the sac and let out a considerable quantity of fluid on several occasions. He placed a silk ligature about the pedicle, close to the body of the child, tying it, with strict injunctions to loosen it in case convulsions came on. He tightened the ligature daily until July 12, when he removed the dried-up substance. The recovery was rapid and the child remains well.

Case reported by Dr. John Wilson.² Child, two months old. Tumor had been punctured several times. Located in upper dorsal vertebræ. Opened by a free longitudinal incision, dressed with carbolized oil and lac plaster. Recovery slow. At end of two months cicatrization complete. Six months later reported well.

Mr. Atkinson reported a case of spina bifida cured by the use of the elastic ligature. Quite a number of cases are reported as operated on by this method, especially by the Italian surgeons. Obviously elastic compression is, however, applicable to only a small class of cases having comparatively small pedicles.

Dr. W. H. Fitch³ reported a case of cure of spina bifida by

¹ London Lancet, December 10, 1870, p. 841.

² British Medical Journal, 1875.

³ Chicago Medical Journal, 1880.

excision. Child, one year old. Tumor egg-size, situated in lumbar region. Dissected and ligated base. Clear fluid escaped in considerable quantity for nearly two weeks. Patient slowly improved, and three months later reported well.

Mr. W. Pye¹ reported the following case: Child, eight weeks old. Tumor in lumbar region, size of an infant's head. Pedicle about the thickness of a man's thumb. Tumor covered with skin. Chloroformed; clamped the pedicle and removed the tumor. On the fourth day removed clamp. Slough separated the twelfth day.

At the meeting of the Clinical Society of London, on March 27, 1885, Mr. Mayo Robson,² of Leeds, described four cases of spina bifida on which he had operated, exhibiting two of the patients. The first case upon which he operated was described in the *British Medical Journal* for March 24, 1883; it died one year after the operation, from teething convulsions. At the site of the tumor there was only a linear scar. Of the cases presented to the Society one was that of a sixteen-year-old girl who had had the tumor tapped repeatedly, and at the time of operation was apparently sinking from exhaustion. After reflecting the skin by a crucial incision, Mr. Robson excised the sac, and the cavity was drained for a few days. The patient was discharged cured at the end of twenty-four days, with the wound quite healed, and only a scar where the tumor had been.

The second patient shown was a child, aged seven; the skin was dissected from the sac and the redundant sac and integument removed; the meninges were sutured with catgut, and the skin with wire. The patient was discharged cured in thirteen days.

All of these operations were performed under strict antiseptic precautions, a eucalyptus atmosphere being used instead of the usual spray. Mr. Robson called special attention to the principle of closing the meninges by bringing together two serous surfaces, as in peritoneal surgery; to the great importance of employing the strictest antiseptics; to the value of this method in cases in which other forms of treatment are not available, as when the sac is thin or the opening into the spinal canal is large; to the possibility of transplanting periosteum and its capability of surviving; he thought that periosteum from a recently-amputated

¹ *British Medical Journal*, July 9, 1881.

² *New York Medical Journal*, April 25, 1885.

limb would give good results. In one case the sac was acutely inflamed, but complete removal with efficient drainage effected a cure.

Dr. R. T. Hayes,¹ of Rochester, N. Y., reported an interesting case where he followed Mr. Robson's method. Child nine and one-half weeks old; otherwise of healthy development. Tumor in lower dorsal region. At birth one-third the size of a hen's egg, but had doubled in size. Chloroformed with head low. Upon aspiration the child immediately collapsed, but rallied slowly. Opened the sac and dissected the superfluous membranes which were closed by six interrupted catgut sutures. Introduced twenty small grafts of periosteum from a freshly-killed rabbit. Union imperfect. Several ounces of serum drawn away during the following days, the sinus discharging until the tenth day; never pus. Three months later the cure is reported satisfactory with a firm, hard, resistant covering. Dr. Hayes comments upon the operation as follows: "I would add to Mr. Robson's points in operating: first, care in removing a portion of the fluid before free incision as a guide to the degree of tolerance in each case, for such a procedure; second, the careful maintenance throughout the operation, and for some time after of such a position of the patient as will most favor the retention by gravitation of the largest amount possible of the cerebro-spinal fluid. Finally, I would remark, the apparent confirmation of the successful application of periosteal grafting in this operation."

Mr. Walter Whitehead² reported to the Royal Medical and Chirurgical Society an operative case of spina bifida in the Manchester Royal Infirmary. Female, aged twenty-eight. Until twenty-one years of age the tumor gave little discomfort, and was small. Grown more rapidly the last seven years, and patient suffered severely from headache, vertigo, etc. The tumor reached from three inches above the iliac crest to within an inch of the tip of the coccyx; its circumference was twenty-two inches; its transverse diameter fourteen inches. The tumor was tapped, but the cerebral disturbances were more marked. Refilled and gradually drained until sepsis occurred. On November 8, 1883, the treatment having been continued since July, the tumor was laid open, the pus evacuated, and the cavity loosely packed with

¹ Medical Record, June 16, 1883.

² British Medical Journal, January 26, 1884.

iodoform gauze. The wound healed gradually, and two months later the cavity was completely obliterated, no tenderness or discomfort left.

Dr. E. H. Bradford,¹ of Boston, reported the case of an infant of five months. Tumor in the lower cervical region. Operated on by ligation and compression at the base of the sac, with a silver wire introduced subcutaneously. The sac was then excised, and no nerve filaments were found in it. Dressed antiseptically. From the third day there was a slight leakage of serous fluid. Death occurred the fourth day without symptoms of meningitis.

Dr. Thomas Sinclair² reported a case treated by excision. Plump, healthy girl, three months old. Small lumbar spina bifida about size and shape of half an egg, opposite dorsal and upper lumbar vertebræ. A thin translucent pedicle, beautifully injected with an open meshwork of blood-vessels, enclosed about half an ounce of clear fluid. Operated September 21, 1885. Cut rapidly around junction of pedicle and skin, but could not remove it on account of a strong fibrous cord attaching its summit to base. He cut through it. Touched skin edges and peripheral parts of base with nitrate of silver. Wound granulated kindly, and patient discharged at the end of one month.

Mr. J. K. Barton³ reported an interesting case of spina bifida in a child two weeks old. Sac was excised under careful antiseptic precautions, and the flaps drawn together by a double row of sutures. Wound dusted with iodoform, and dressed with iodoform gauze. There was no elevation of temperature, and the union was complete and firm in a week. Discharged in ten days cured without loss of power in limbs. After writing the report, information had been received of the death of the child in a fit of convulsions.

Dr. F. J. Groner⁴ reported a case of spina bifida. Child three months old. Tumor in cervical region; sac three and a half inches in diameter. Dissected, transfixed with a double catgut ligature, tied and cut away sac. Slight subsequent escape of fluid. Union complete the seventh day. Dr. Groner raises the query, Why not operate under modern aseptic precautions with success?

Dr. Z. H. Evans⁵ reported a case of surgical treatment of spina

¹ Boston Medical and Surgical Journal, February, 1886.

² Dublin Journal of Medical Sciences, March 8, 1886.

³ London Lancet, October 2, 1886.

⁴ American Lancet, 1888.

⁵ New York Medical Journal, August 25, 1888.

bifida with illustrations of the case before and after operation. Boy six years old. Two sisters of the mother had given birth to children with spina bifida, her child being the fourth in the family. Tumor size of an orange, attached to the second and third lumbar vertebrae. A small piece of necrosed bone was found in a pus pocket. Upon dissection the sac led down to an opening the size of a lead-pencil to the cleft, which would admit the thumb. The cord was clearly exposed to view. The sac was excised and sutured. The third day there were convulsions, followed by a free discharge of spinal fluid. This continued for three weeks. Cicatrization went on slowly until at the end of three months the back was entirely free from pain and tenderness. Upon looking up the subject, Dr. Evans meets the long array of surgical authorities opposing the operation, and failed to find the record of any cases submitted to successful surgical treatment. He therefore points to his case as the first on record, resulting in a permanent cure.

Bayer¹ reported a successful case operated on where the sac was dissected to its base, opened, and the cauda was replaced in the spinal canal. The sac was sutured, and the wound closed. He suggests the possibility of forming a bony covering by making lateral periosteal flaps from the canal of the sacrum.

Dr. E. P. Hurd, of Newburyport, reported a very interesting case of operative treatment. Child seventeen months old. Tumor size of a large bowl, covered the sacral region as far down as the cleft of the buttocks. Aspirated a pint and a half of fluid as thin and clear as spring water. Operation October 15, 1889, assisted by Dr. G. W. Jones. A linear incision was made over the tumor, freely exposing the whole of the sac. The cauda, which was spread out over the surface, was traced to an indentation over the last lumbar vertebra, through which a probe was passed into the spinal canal. A considerable portion of the surplus integument and the sac were hastily removed, and the edges of the incision brought together, with a continuous catgut suture, and covered with flexible collodion. Five days later the wound opened, and about a pint of fluid escaped. The following day the remainder of the sac was dissected to its base, and wound closed with continuous chromicized animal sutures, taken from either side in a manner to reinforce and strengthen the covering struc-

¹ Zur Chirurgie des Rückenmarksbrüche: Prag. medicinische Wochenschrift, 1889.

tures, and the wound sealed. The recovery was rapid, without incident, and resulted in a firm solid cicatrix.

Dr. J. C. Cockburn,¹ of Minneapolis, reported a case treated by excision with recovery. Tumor located over sacrum, resembling in size and shape the larger end of a hen's egg. Operation November 14, 1889, performed aseptically. An elliptical incision was made around tumor, keeping well back into the healthy skin. The dissection was slowly and carefully made down to the spinal column, which was readily reached, except at inferior portion, where a dense, fibrous band or mass connected the tumor and the sacrum. The pedicle was separated from this fibrous band, and the latter cut through. The knife was then raised and the tumor compressed in order to return as much of the spinal fluid as possible within the membranes of the spinal cord, and a stout catgut ligature tied round the pedicle. Sudden failure of respiration followed on tightening the ligature. A trocar was thrust into the tumor, and three fluid ounces of cerebro-spinal fluid withdrawn; the sac was cut open, and the cauda equina was found included in the ligature, and the extremity adherent to the dorsal lining of the sac. With the hips elevated, the ligature around the pedicle was quickly cut. The caudal extremities and that portion of the dura to which they were attached were hurriedly dissected from the sac, and an unsuccessful attempt made to return this mass within the spinal canal. The sac was excised close to the ligature, and the stump returned within the spinal canal. The wound was then closed by deep and superficial catgut sutures, and a braided catgut drainage left in the lower portion of the wound. One month after operation wound was completely healed, cicatrix smooth. April 11, 1890, five months after operation, child healthy, vigorous, and no nervous symptoms.

Mr. J. Stewart² reported a case of excision of the sac of spina bifida operated on by Dr. Leonn. Child otherwise healthy. Tumor, size of a hen's egg, in the lower lumbar region, the membranes were semitransparent, the tip of the forefinger easily plugging the opening in the bone. Two flaps of healthy skin were dissected from the sac and a ligature of chromicized catgut placed round the pedicle. After opening the sac, and finding no nerves present, he tied his ligature, cut away the sac, and stitched up the flaps. Union by first intention.

¹ American Journal of the Medical Sciences, August, 1890, p. 165.

² British Medical Journal, February 21, 1891.

Dr. R. H. Seelye,¹ of Springfield, Mass., reported the case of a boy, three years old, upon whom he operated in May. Tumor, over second lumbar vertebra, size of an English walnut at birth, but had increased until it measured 22 centimetres in circumference. It was dissected to the base, which measured only 175 millimetres in circumference, ligated, tumor excised, and the superjacent parts sutured. Union was primary, and four months after operation there was no return, no tenderness, and the cure seemed complete. Fluid that escaped clear, specific gravity 1006; no nerve elements were found in the sac.

From the above record, Dr. Trowbridge was, undoubtedly, the first to plan deliberately to dissect the sac, open the canal, and treat intelligently the varying conditions, and then close the wound. His first two cases, treated by slow compression, had taught him that by these measures the sac had not taken on adhesive inflammation, although the integuments had sloughed. In closing his article, he commented upon the advisability of operative procedure, and states that about thirty cases of spina bifida had come under his personal observation and study. It does not appear that Dr. Purdy, of New York, who operated nearly twenty years later, knew of the experience of Dr. Trowbridge, but it is very probable. He was the second to publish his experience in dissecting the parts, excising the sac, and closing the wound. Mr. Page's operation, published in 1847, was undertaken only as a secondary consideration, after repeated attempts to cure by elastic compression.

Dr. Sayre operated by transfixing the small pedicle, and ligaturing tightly without dissection.

Thus it appears that, in this early formative stage of American surgery, operative measures undertaken for the cure of spina bifida, born from a suggestion of Sir Charles Bell, in a preceding generation, were crowned with success; and were as effective as it was possible to make them, until applied under the later knowledge, which renders aseptic surgery the crowning glory of the present century.

¹ Boston Medical and Surgical Journal, November 17, 1894.

THE TREATMENT OF CICATRICAL STRICTURE OF THE ŒSOPHAGUS BY RETROGRADE DILATATION.¹

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RETROGRADE dilatation for cicatricial stenosis of the œsophagus was first performed, so far as I am able to discover, by Von Bergmann early in 1883, and at about the same time by Schattauer. Dr. Abbe has credited Albert with the first operation of this kind, but I have been unable to find any report of the case. The suggestion is ascribed by Newman² to Schede, though Schede's suggestion seems to have related to pyloric and not to œsophageal strictures. Trendelenburg,³ in reporting the first successful case of gastrostomy in Germany, which was operated on by him for cicatricial stenosis, remarked that an attempt was made to enlarge the stricture from the stomach by a sound, but did not succeed. This is the earliest instance that I know of where not only the idea was suggested by an attempt made to apply it in practice. Loreta, to whom Franks⁴ wrongly ascribes the idea, as well as the first performance of the operation, may be considered as its step-father, for in the same year with Von Bergmann's and Schattauer's operations he operated twice, and shortly afterwards twice again.

The cases previously reported of retrograde dilatation for

¹ Read before the New York Surgical Society, December 12, 1894.

² London Lancet, February 13, 1892, p. 359.

³ Langenbeck's Archiv für klinische Chirurgie, 1877, Bd. XII.

⁴ ANNALS OF SURGERY, XIX, 1894, pp. 355-378.

cicatricial or simple stricture, which I have been able to find, number 27, making 28 with the case now reported for the first time.

Hagenbach,¹ in 1889, collected six cases, including Socin's, which he reported, and not including Loreta's, to whom he referred as having operated without knowing the number of his cases. Two years later Gissler² reported eight cases, without, however, including Loreta's, and two years later still H. Krüger³ recorded nine cases, omitting also the Italian ones. During the present year Kendall Franks⁴ collected twenty-one cases, but two of these form but a single case reported by Gissler, but operated by Kraske.

To those twenty cases I am able to add eight more, including my own.

CASE No. 21.—Schattauer's case, the second case operated upon, referred to,⁵ and included in the lists of Krüger and Gissler. The case was one of double stricture of the œsophagus, due to swallowing sulphuric acid. Attempts to dilate from above or below after a gastrostomy in two sittings were unsuccessful, until a small bougie was introduced up to the stricture from below by a straight œsophageal forceps, the blades of which were then opened, allowing the bougie to be pushed up through. Then larger and larger bougies were used until the patient could take nourishment by the mouth, and was cured.

CASE No. 22.—Abbe's second case.⁶ Here what seems to me to be the ideal method was used. The entire procedure was completed in a single operation. The stricture was dilated as much as possible by bougies pulled up from below by a silk thread, and then the string-saw method was used to further dilate, or rather divide up to the limit. The wounds were closed, and after a few days bougies were passed from above.

CASE No. 23.—Edmund Andrews reports⁷ the case of a child of

¹ Correspondenzblatt für Sch. Aerzte, March, 1889.

² Beiträge zur klinische Chirurgie, Bd. VIII.

³ Münchener medicinische Wochenschrift, 1893, pp. 226-229.

⁴ Loc. cit.

⁵ Centralblatt für Chirurgie, 1884, p. 95.

⁶ ANNALS OF SURGERY, January, 1894, p. 88.

⁷ Chicago Clinical Review, Vol. III, February, 1894, p. 292.

three years, whose œsophageal stricture, due to the swallowing of lye, gradually became impermeable in spite of the passage of bougies. Here, too, the operation was done in one sitting, including suture of the wounds. The œsophageal opening could not be felt by the finger introduced into the stomach, but was entered by a small bent uterine sound, then a larger one was passed up, which was replaced by dilating forceps, allowing the final passage of a large Britannia metal sound with considerable force.

CASE No. 24.—W. J. Mayo¹ reports the case of a child of three years, who had swallowed lye one year before. For six months there had been difficulty in swallowing liquids, more than one-half of the food being regurgitated. The œsophagus above the stricture held over four ounces. Repeated attempts to pass bougies, with and without anæsthesia, failed. Gastrostomy after Fenger's method. The lower surface of the stricture was searched several times for the opening, twice with the aid of the finger through the small fistula, but without success. Five weeks after the first operation external œsophagotomy, through which bougies were pressed down from above, and by the help of a finger in the stomach, a long probe was finally passed through carrying 'two strands of braided silk. Abbe's string-saw method was then used, modified by using knots in the second thread to dilate the stricture, instead of a bougie. For one month this process was repeated every four days. Bougies were then inserted from the neck, and later through the mouth, and the threads were removed after five weeks. In two months the patient was discharged able to take milk, chopped meat and bread quite readily. The œsophageal fistula had closed, and the gastric fistula nearly so, after being touched with the Paquelin.

CASE No. 25.—The case operated upon by Dr. Murray, according to Abbe's method, and reported and shown to this society at the meeting held October 10, 1894, and published,² has been so recently before the society as to need no further description.

The same may be said of

CASE No. 26, which was reported at the same by Dr. Kammerer as having been operated upon by Dr. Gerster.

CASE No. 27.—Another case, also operated by Dr. Gerster and reported by him in his book,³ may be classed among these cases, for,

¹ New York Medical Journal, 1894, Vol. LIX, p. 433.

² ANNALS OF SURGERY, Vol. XX, December, 1894, p. 733.

³ Aseptic and Antiseptic Surgery, 3d ed., p. 154.

though the retrograde dilatation was not apparently continued after it had been once successful, it apparently paved the way for dilatation from above. The stricture, twelve inches from the incisor teeth, was due to swallowing carbolic acid. Gastrostomy in two sittings. Daily attempts were made for twenty-three days to pass the stricture with a sound from below before it was successful. Finally, an elastic catheter with a stylet was passed, and the next day the passage of a small-sized sound from above was possible.

CASE No. 28.—The case I have to report is as follows: Mrs. M. J., aged thirty-two, was admitted to Bellevue Hospital February 7, 1894. In November, 1893, she swallowed some potash lye by mistake. After the acute symptoms passed off she found that she could not swallow solids. She had therefore fed on milk, the swallowing of which became more and more difficult, and sometimes impossible. Solid food soon after being swallowed was regularly regurgitated, and at times, especially in the morning, milk was also largely regurgitated. The patient was emaciated, though not yet extremely so. Repeated and unsuccessful attempts to pass bougies of all kinds and sizes were made by Dr. J. Wohlfurth, of this city, by whom the patient was referred to me. I repeated the attempts at the hospital without success. A No. 9 (Eng.) œsophageal bougie passed ten or ten and a half inches from the incisor teeth, but no further. This would locate the upper end of the stricture four or four and a half inches below the upper end of the œsophagus, which would bring it near the level of the bifurcation of the trachea. After swallowing considerable fluid the lower part of the neck anteriorly seems distended and enlarged. Gastrostomy with retrograde dilatation of the stricture, with or without the use of Abbe's string-saw method, was determined upon, Dr. Abbe having kindly lent me several instruments for the purpose.

February 12, 1894. Under ether the attempt was again made to pass bougies from above, but without success. Accordingly a gastrostomy was performed after Fenger's method with a four-inch incision. The stomach was easily found, sutured into the abdominal wound, and opened by a free incision about two inches long. The stomach was then washed out and the finger introduced. Even through this large opening, and with considerable pressure, it was found very difficult to explore the cardiac orifice of the stomach, and it was only after some time that it was found. A No. 9 (Eng.) bougie was then guided into the œsophagus by the finger. This was resisted at the stricture, but after a little steady pressure it passed through.

Two stout silk strands were then threaded through the end of the bougie and brought out through the mouth. By one of these conical capped bougies were drawn up through the stricture, the size increasing up to No. 15 (Eng.). When firm resistance was met, the second string was used as a saw, according to Abbe's method. Owing to the length of the stricture, exact measurement of which could not unfortunately be taken, bougies not capped and pulled through could not be passed even after active use of the string-saw. Consequently, a large perineal drainage-tube was pulled up through the stricture and left with the lower end passing out through the abdominal opening, where the mucous membrane had been sutured to the skin. Owing to the large size of the opening and the difficulty of retaining the stomach contents rectal feeding had to be resorted to almost exclusively until the second operation, one week later. At that time the drainage-tube came away easily, having acted as a dilator. Capped bougies No. 17 and 19 (Eng.) were drawn up through the stricture by means of silk strands passed as before. The string-saw was again used, and McKenzie's bougies of the largest size were thus passed from below without much difficulty. The stomach was then detached from the abdominal wound, and the gastric opening was sutured by a continuous Lembert suture, and an outside interrupted Halsted quilted suture of fine silk. The stomach was then dropped back, and the abdominal wound sutured in the ordinary way. Uneventful healing *per primam*. Food was taken by the mouth after three days, and patient found that she could swallow liquids much more easily without their being arrested or regurgitated. She was encouraged to eat soft food, which also passed, but on the first attempt to pass a bougie, about a week after the last operation, only a No. 9 (Eng.) conical bougie would pass. This was continued every other day, the size being slowly increased to No. 12 (Eng.), when she left the hospital, March 13, having gained eleven pounds. Since leaving the hospital the patient has returned twice or three times a week, and by July 1 a No. 18 (Eng.) bougie had passed, and some time previously she had been eating almost all kinds of solid food, and had gained more than twenty pounds, and looked like a different woman.

At the first operation, no bougie, unless guided by a string, would pass down the œsophagus, apparently on account of the pouching of the œsophagus about the stricture. After the second operation, however, the pouch had already contracted considerably, and the stricture was more fully dilated, so that a bougie would pass from above,

though not as easily or as certainly as from below. A mistake was made in not passing bougies sooner after the second operation, as I think ground was lost by allowing the stricture to recontract. At the present time a No. 19 (Eng.) conical bougie passes the stricture, and the patient can swallow all kinds of food. Bougies are still passed twice a week.

Among the twenty-eight cases the details of technique present considerable variety, often showing much ingenuity in overcoming difficulties.

The method of operating on the stomach varies between gastrotomy and gastrostomy. Gastrotomy, where the stomach is opened and closed in one operation, is the method employed by Loreta in his cases, which was similar to that previously employed and recommended by him in pyloric stenosis, with the exception that a long and powerful dilator took the place of the finger as the dilating instrument. This method was followed by Catani and Frattina in their cases, as also later in the cases of Spannoche and Franks, and essentially in that of Andrews.

The principal objection to Loreta's method depends upon the violence of the dilatation. This was shown in at least two of his cases, where alarming symptoms of dyspnœa, high pulse, respiration, and temperature, with cough and bronchorrhœa commenced on the fourth day after the operation and lasted five days. Barring this objection, and provided the functional results and percentage of mortality are equally favorable, the method of Loreta in one sitting seems to me preferable to a gastrostomy where a fistula remains a varying length of time. This being the case, I think that Abbe's method, as employed in his second case, is the ideal method, combining the advantages and avoiding the disadvantages of Loreta's operation. Abbe's method has been briefly described in noticing his second case. In both Abbe's and Loreta's cases the functional result was a cure so far as recorded, and in all there was no death. I would lay down, then, as the first proposition,—

(1) That if it is possible to dilate the stricture sufficiently in one sitting, the wound of the stomach should be closed immediately.

This may be impracticable if the patient is so weak that feeding by the stomach at once is essential, or if, for any reason, rectal feeding is insufficient or impossible. Furthermore, the ideal procedure may be modified if, as happened in my case, it is not possible to dilate the stricture sufficiently at the first operation. In such a case after a short and varying time, during which rectal feeding may be partly or entirely depended upon if the opening into the stomach is large, a second retrograde dilatation may, and in my case did, dilate the stricture to the largest size, after which the gastric wound may be closed.

If gastrostomy instead of gastrotomy is done, as it has been in seventeen out of the twenty-eight cases, the operation may be and is done in either one or two sittings. In at least five or six of the above seventeen cases gastrostomy was done in one sitting. Formerly, to judge from a study of statistics, the operation in two sittings was preferred by most on account of the lower mortality. The above cases are too few for comparison, but I think that at the present time with proper care the one is as safe as the other. That being the case the operation in one sitting is to be preferred, for it has certain advantages. If it is found possible and practicable to dilate sufficiently at once, the stomach may be sutured and dropped back, and the abdominal wound closed after dilatation is completed, as in the ideal method.

At least two of the cases operated on in one sitting and mentioned above would probably have been completed in one operation if the dilatation had been satisfactory at the first operation. Again, if rectal feeding is not satisfactory or is contra-indicated, and the weak condition of the patient demands nourishment as soon as possible, the operation in one sitting is to be preferred.

As a second proposition, then, we can say,—

(2) That the opening of the stomach is best done in one sitting. Furthermore, the size of the opening into the stomach is another detail of importance that varies in practice. The question of the size of the opening depends partly upon how the dilatation is to be done and the after-treatment of the case. If either Loreta's or Abbe's methods are employed, the opening

should be large enough to allow the easy introduction of one or two fingers besides dilating instruments. The only objection to a large opening is the difficulty of preventing the leakage of the stomach contents, as was experienced in Von Bergmann's case. But this may occur, no matter how small the opening, unless some method, such as Witzel's, Von Hacker's, Francke's, or Hahn's is used, and it may be minimized by making the opening as high up on the anterior wall and as near the cardia as possible; a position which is also the best for dilating the œsophagus. Moreover, if the opening is large, the chances are that there will be little delay in dilating the œsophagus, after which the opening may be closed, and during this time feeding by the rectum may be satisfactorily employed as in the case I have reported. The great objection to a small opening lies in the difficulty of reaching and finding the cardiac opening of the œsophagus. It is not always easy in any case, as I have found myself, and in the report of Loreta's cases by T. Holmes, the statement is made that finding the orifice of the œsophagus "involved considerable difficulty." Much greater is the difficulty when the opening is small, as many of the histories of these cases indicate. In most of the cases operated on, in two sittings the opening was intentionally made small to avoid, as far as possible, the difficulty of leakage through the fistula. But in Caponotto's case, as well as in Von Bergmann's, operation in "one sitting," a large opening was made to give better access to the lower end of the œsophagus, and, to quote Gissler,¹ it is doubtful if the dilatation of the stricture would have otherwise succeeded in Von Bergmann's case unless he had been able to examine the cardia with the finger. Nor is this a solitary instance, for the same may be said of Caponotto's case and several others.

When the opening is small, the finger can only be introduced through it with difficulty, if at all. With the finger so introduced it would be difficult to find the œsophagus, or, if found, to do anything with the finger in guiding bougies or instruments, unless the stricture were just at the cardiac orifice of the stomach. As Gissler² says, the introduction of sound or

¹ Beiträge zur klinischen Chirurgie, Vol. VIII, p. 409.

² Loc. cit.

catheter-like instruments into the œsophagus from the fistula is a matter of chance, no rules can be laid down for it. This is illustrated by Kraske's case, reported by Gissler, in which repeated attempts were made for a long time (two months), even with artificial illumination of the stomach, and yet without success. A third proposition follows from this,—namely,—

(3) The opening into the stomach should be of sufficient size to allow of the use of the finger in examination and in guiding instruments to the cardiac orifice of the œsophagus.

Another question is as to the closure of the operation wound or fistula. There is no doubt in my mind that the best method is to close the opening in the same operation in which it is made, as in the methods of Abbe or Loreta. If this is not done, the opening should be closed as soon as possible, and the larger the opening the sooner should it be closed. Of course, closure of the opening is not to be done until dilatation has been fully accomplished, or, failing in this, until dilatation has been sufficient to allow of feeding by the mouth and continued dilatation of the œsophagus from above. It should be remembered, as Gissler¹ says, that an examination of the literature shows that it has not infrequently given great difficulty to close the fistula. This is a decided objection to the operation in either one or two sittings, in which a small opening is made with a view of leaving it for some time for the purpose of feeding until dilatation has eventually been accomplished. The closure of the wound is best done by freeing the stomach from the abdominal wound, closing the gastric wound, and dropping the stomach back into the abdomen. This is preferable to trying to close the fistula while leaving the stomach adherent to the anterior wall of the abdomen, as was apparently done in the case reported by Krüger² from Hoffa's clinic, in which the fistula so closed was repeatedly torn open and as often resutured.

The methods of passing the first dilator or guide for a dilator through the stricture are many and ingenious. In most of the cases reported the stricture was impassable from above.

¹ Beiträge zur klinischen Chirurgie, Vol. VIII, p. 409.

² Loc. cit.

This is easily explained by the pouching which almost always occurs above such a stricture, the opening of which may also be situated eccentrically. From below, however, we have an inverted funnel-shaped segment of the œsophagus leading directly into the lower end of the stricture. The most natural way to proceed, and the one most likely to succeed in the majority of cases, is to pass a small instrument up from below. This, we have seen, is one of the strong arguments in favor of a large opening into the stomach, by means of which we can guide an instrument into the œsophagus by the finger. In two cases (Maydl's and Lange's) a bougie was passed from above by which a silk ligature was carried through the stricture. In another case (Caponotto's), under control of the finger in the stomach, the rod of a Verneuil's dilator, introduced from above, was passed into the stomach, where olive-shaped bulbs were attached and drawn up. In Von Bergmann's case the sound introduced from above could not find the opening, and under control of the finger in the stomach was forced through the thin layer of interposing tissue. Schattauer, unable to pass a fine bougie from below, introduced it into the stricture from below in an œsophageal forceps and then on opening the blades of the forceps, and thus, stretching the stricture, he was able to push the bougie through. These are all solitary examples, and most of them were expedients for an emergency. There is one expedient of passing a guiding thread from above which deserves to be mentioned, for it will probably be found to be the method best to adopt when for any reason a small opening has been made into the stomach. This was first employed in Socin's case, reported by Hagenbach, and consists of swallowing or introducing as far as possible into the stricture a thread fastened to a small shot. This works down through the stricture, falls to the lower part of the stomach, whence the thread may be hooked out through the fistula. It seems to work better than a modification of it, used in Kraske's case, where a knot replaced the shot, and when it had passed into the stomach it did not fall to the lower part but stuck in the folds of the membrane, and could not be found until it was flushed out with water. The mere use of a thread as a guide through

the stricture for use in dilatation, and without its passage by a shot, cannot properly be called Hagenbach's or Socin's method, as has been done by Franks in his list of cases, for this had been used previously by Maydl and Soldani, by both of whom it was passed by means of a fine bougie, as is done in Abbe's method.

The methods of dilating the stricture are even more numerous, varied, and ingenious than are those for passing a guide. The method most often used among the twenty-seven cases has been the rapid or immediate method of Loreta, of which there are ten or eleven cases. Sometimes a uterine, pharyngeal, or Otis's dilator has been used. Loreta used a large, long-bladed dilator. In other cases I have found no mention of the particular instrument employed. The only objection to this method is the possible occurrence of the complication noted in two of Loreta's cases and already referred to. Next in frequency of application are Abbe's method and what may be called Maydl's method, in which larger and larger conical-capped bougies are drawn up by a silk ligature attached to the cap. Abbe's method comprises the latter and supplements it by the string-saw when the size of the bougie is such that it cannot be pulled or pushed through without considerable force. The stricture is put on the stretch by means of the largest possible bougie passed into it from below, or, as in Mayo's case, by a second cord with a large knot drawn into the stricture. The string-saw only cuts the parts put upon the stretch, and is therefore safe as well as effective. The nearest approach to this method was that employed by Soldani in the early treatment of his case, when he pulled up through the stricture larger and larger knots made on a cord passing through the stricture. "Olives" on a string or staff or on a bougie have been employed in several cases, while single instances of the following methods are on record: sponge tent by Von Bergmann, electrolysis by Hjort, and internal œsophagotomy by Lange, in both the latter cases the instruments being passed from below. In Socin's case increasing sizes of violin strings were drawn up through the stricture and left in position about two hours, while their increase in size from absorption of moisture gradually dilated the stricture. In the case I have reported, the dilating force was twofold. I am

inclined to think that the most effective part was the passage of conical bougies pulled up from below by the silk ligature attached to the metal caps. This dilated it for the passage of bougies large enough to have sufficient stiffness to be pushed through from below. I could also readily feel that the use of the string-saw, according to Abbe's method, was quite effective. That it was not more so was due probably to the fact that the stricture was a long and rather tortuous one, and perhaps it was not as well applied as by its originator. My experience with it was sufficient to enable me to bear testimony to the efficacy of this ingenious method. I can heartily second Dr. Abbe's recommendation of it in case bougies of increasing size cannot be passed without undue force. It will probably be applicable in a large proportion of cicatricial strictures, and especially effective when the length of the stricture is not great. It is on the whole the most ingenious, the safest, and the surest operation, and the one most to be recommended.

The after-treatment allows of but little variation. After the stricture has been rapidly dilated, the passage of bougies from above has almost always been employed for some time with increasing intervals. This is necessary to insure the patency of the canal. In the second of Loreta's cases, however, three months after the operation no instrument had been passed by the mouth, and the patient was able to take food of all kinds and was quite well. When, however, the stricture is rapidly stretched or cut, I see no reason why recontraction should not take place as it has been found to do after internal œsophagotomy unless bougies are occasionally passed. In the case I have reported this is exactly what happened, for the passage of the first bougie was delayed too long (eight days), and whereas at the second operation the largest-sized bougie passed a week later, a No. 9 (Eng.) was passed with difficulty from above. It would be decidedly unsafe, it seems to me, to omit the passage of bougies for any length of time until the tendency to recontract is found to have disappeared, in spite of the fact that both Lange and Sands have reported a lack of tendency to recontraction after œsophagotomy. Of course, if at the operation bougies of at

least eighteen millimetres in diameter could not be passed, the process of dilatation must be continued until this point is reached, and as long after as required. The swallowing of solid food as soon as that becomes possible may also serve a useful purpose in keeping the strictured œsophagus dilated.

There can be no question, it seems to me, that the class of operations that we have been considering is far preferable to any other form of treatment of an impermeable cicatricial stricture of the œsophagus. Two substitutes for this operation may be mentioned, the first without any recommendation, though it has that of Graser,¹—namely, the performance of external œsophagotomy,—and through this dilating from above or performing internal œsophagotomy according to the method of Gussenbauer. Graser says that in cases of impermeable or very narrow strictures of the œsophagus, the stricture, even when just at the cardia, is easy to pass from the fistula in the neck, and can be quickly dilated by permanent bougies. He adds that in Erlangen this procedure is used for cicatricial as well as carcinomatous stenosis with the best result. The experience of most surgeons is at variance to this,—namely, that a stricture impermeable from the mouth is nearly equally so from the neck, and that both Graser's and Gussenbauer's methods are not successful in such cases. Abbe found this to be so in his first case, and many others have had the same experience.

Secondly, as compared with gastrostomy, we have in retrograde dilatation a radical cure or a *restoratio ad integrum*, or nearly so, instead of a fistula with various degrees of discomfort according to the difficulty of preventing leakage. As to the immediate results so far all the twenty-eight cases of retrograde dilatation reported have been successful, with no death due to the operation, a rather remarkable showing considering the weakened condition of some of the patients. Newman reported in 1892 forty-eight cases of gastrostomy for cicatricial stenosis since 1876, of which twenty-five recovered and twenty-three died within a month.

¹ Verhandlungen der deutschen Gesellschaft für Chirurgie, XIX, 1, p. 136.

Furthermore, the above twenty-eight cases were successful from a functional stand-point. If gastrostomy is to be done, Witzel's method would be preferred, except for one drawback. The opening into the stomach is so small that exploration with the finger or instrumental dilatation cannot well be carried on, for it seems to be a disadvantage to make a large gastric opening in Witzel's operation and then suture it up. Again, after a Witzel operation is completed, the fistula is not straight, and retrograde dilatation would be impossible. For this reason a gastrostomy according to von Hacker would be preferable, but even here, on account of the small size of the opening, retrograde treatment would be difficult or impossible without the expedient of a shot-weighted string employed by Socin and reported by Hagenbach.

There is one question of interest in connection with simple gastrostomy performed for such cases. This may be introduced by the statement of von Hacker, who says that after gastrostomy one is, as a rule, able later on to pass a thin catgut through the stricture even when it was not possible during the operation, and on this as a guide to pass a string out through the fistula, with the aid of which one can gradually dilate the stricture by means of bougies, etc. This is the plan of operation now employed and lately reported by von Hacker.² The part of this statement which is of interest is the fact referred to that after a period of rest due to the gastrostomy the œsophagus may become permeable from above. Thus von Noorden³ reports a case operated by Mikulicz, in which a gastrostomy according to Witzel was done for an impermeable cicatricial stricture due to swallowing lye. After four weeks' rest of the œsophagus the patient was again able to swallow fluids. Dilatation was commenced from above, and in four weeks' time every kind of cooked food could be swallowed. Fifty-seven days after the operation the tube was removed from the stomach, and in sixteen days more the fistula was solidly and spontaneously healed. Also in two cases of carcinomatous stricture after operation swallowing became easier.

¹ *Archiv für klinische Chirurgie*, Band XLV, pp. 605-621.

² *Wiener klinische Wochenschrift*, 1894, Nos. 25 and 26.

³ *Berliner klinische Wochenschrift*, 1893, p. 96.

This same fact is incidentally recorded in a number of operations in which gastrostomy has been performed for simple or malignant stricture. But the objection of recommending it as a substitute for retrograde dilatation, especially of the ideal kind, is the fact that it is not constant. In some cases, especially of non-malignant stenosis, the stricture is just as impermeable as before, and the patient is then left with a gastric fistula, which must permanently remain unless further operation is submitted to. Thus in Terrillon's case, at the end of eight months the stricture was still impermeable from above, and retrograde dilatation was then successfully employed. Similar cases of the stricture remaining impermeable after the gastrostomy are recorded by Ewald,¹ Lafourcade,² Schattauer (Case No. 21, above), and by others. On account of the uncertainty of the result, therefore, it cannot be considered an operation of choice or one to replace retrograde dilatation by the method used by Abbe in his second case. If for any reason the latter should be contraindicated or refused, and I cannot imagine that it would often happen, the best alternative would seem to me to be the performance of a gastrostomy according to von Hacker, and the passage of a shot-weighted thread through the stricture. By means of this string dilatation in either direction, preferably retrograde, could be undertaken. As a second but more uncertain alternative I would suggest gastrostomy according to Witzel, complete rest of the œsophagus for three or four weeks, and then attempts to dilate from above, which may or may not succeed. If successful, the fistula may close spontaneously.

¹ Zeitschrift für klinische Medicin, xx, pp. 534-560.

² Gaz. hebd. de Méd. et de Chir., par. 91, 2 S. XXVIII, 549-552.

THE TREATMENT OF INJURIES OF THE SPINE
AND CORD BY SAYRE'S PLASTER-OF-PARIS
JACKET.¹

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THE suggestion of immediate fixation in spinal injuries by the use of Sayre's plaster-of-Paris jacket is neither new nor original with the writer; but the tangible results which he has observed from personal experience, and the information which he has obtained from a careful study of the literature of the subject, have induced him to bring before this society some points for discussion in the management of these unfortunate cases.
















It is a well-known fact that patients afflicted with spinal injuries are considered undesirable from a clinical point of view. They are transferred from one hospital to another until one of the eleemosynary institutions upon the island becomes their temporary abode. Nurses dislike to see these helpless creatures admitted to their care, and surgeons are disinclined to allot them space in their hospital wards. The great labor of caring for these unfortunate patients, and their lack of surgical interest, makes them unintentionally a most uninteresting and unwelcome class of cases.

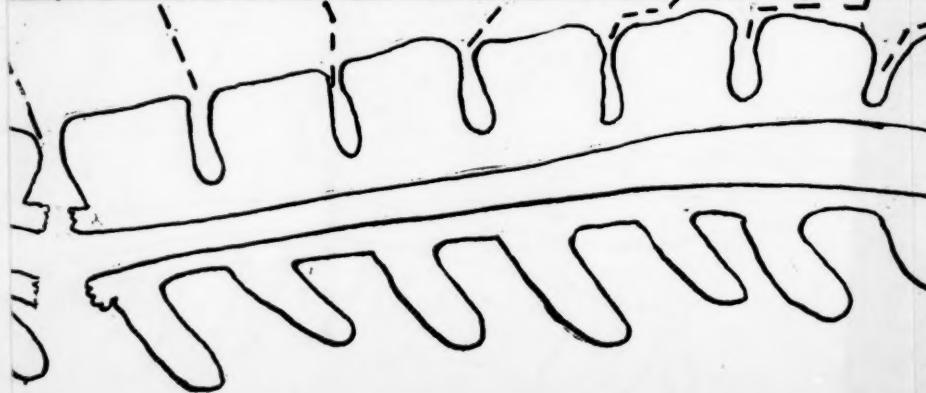
The utter helplessness, the intense suffering, the absolute hopelessness, the wretched discomfort, the living death make them objects likewise of pity to all under whose care they come. On the other hand, the recent advances in the science of neurology, the precision of topographical anatomy, the modern re-

¹ Read before the New York Surgical Society, January 9, 1895.

TABLE SHOWING NERVOUS MANIFESTATIONS FOLLOWING TRAUMATISMS OF THE SPINE. (DENNIS.)

Paralysis			Area of Paralysis		Anaesthesia		Area of Anaesthesia		Reflexes
1 st Cerv.	Death from pressure of odontoid	1 st Cerv.	A = Anterior				A = Anterior	P = Posterior	
2 nd to 3 rd	Death from paralysis of diaphragm	2 nd to 3 rd							
4 th	Paralysis of upper arm muscles.	4 th			Upper Shoulder. Outer Arm.				Pupils.
5 th	Supinators of hand.	5 th			Outer side of arm and forearm.				Pupils Scapular Supinator Triceps.
6 th	Biceps, Triceps, Extensors of wrist.	6 th			Outer half of hand.				Pupils Scapular Triceps Post. wrist Palmar.
7 th	Rotators of wrist, Latiss. Dorsi.	7 th			Inner side of arm and forearm.				Pupils Scapular Post. wrist Ant. wrist Palmar.
8 th	Flexors of wrist, Hand muscles.	8 th			Inner side of hand.				Scapular Post. wrist Ant. wrist Palmar.
1 st DORS.	Thumb.	1 st DORS.			Ulnar supply to hand.				Scapular Palmar.
2 nd to 12 th DORS.	Muscles of back and Abdomen.	2 nd to 12 th DORS.			Skin over back and abdomen in areas corresponding to distribution of spinal nerves.				Epigastric. 4 th to 7 th Abdominal 7 th to 11 th .
1 st LUMB.	Psoas and Sartorius.	1 st LUMB.			Groin.				Cremasteric
2 nd	Quadriceps Femoris.	2 nd			Outer side of thigh.				Cremasteric Patellar.
3 rd	Abductors and inner rotators of thigh.	3 rd			Front and inside of thigh.				Cremasteric

2 nd 12 th THOR.	muscles of back and Abdomen.			Skin over: back and abdo- men in areas corresponding to distribution of spinal nerves.		Epigastric 4 th to 7 th Abdominal 7 th to 11 th .
1 st LUMB.	PSOAS. and Iliotibius.			Groin.		Cremasteric
2 nd	Quadriceps Semoris			Outside of Thigh.		Cremasteric Patellar
3 rd	Abductors and inner rotators of Thigh.			Front and inside of Thigh		Cremasteric
4 th	Abductors of Thigh Tibialis			Inside of leg, ankle and foot		Gluteal



	4th 5th	Adductors of Thigh Tibialis Anticus		Inside of leg, ankle and foot		Gluteal
	5th	Outward rotation of thigh Flexors of knee and ankle		Back of thigh and leg Outside of foot		Gluteal
	1st 2nd 3rd SAC	Muscles of foot Peronei		Outside of leg Perineum, anus Sacrum and genitals		Plantar
	4th 5th	Perineal muscles				Ankle Clonus

The muscles governed by the injured segment are paralyzed and become flabby and atrophied. Those governed by segments below the point of injury are paralyzed as to motion and sensation, but do not atrophy. This is due to the fact that their centres of nutrition in the cord are uninjured. If no treatment is instituted, however, ascending and descending degeneration of the cord takes place, causing atrophy of the muscles governed by the various segments.

PRIAPISM is frequently seen in fractures of the upper part of the spinal column, and is due to the cutting off of inhibitory impulses from the higher centres. The BLADDER and RECTAL centres are in the lower lumbar segments, and traumatism in this region causes incontinence of urine and faeces. Injuries higher up cause retention.

TYMPANITES is seen in injuries to the upper part of the cord; it is due to paralysis of peristalsis.

BROWN-SÉQUARD'S paralysis (loss of motion on one side and of sensation on the other) is seen in unilateral lesions of the cord, such as might be caused by a bullet. It is due to the immediate decussation of the sensory fibres on entering the cord. It is not seen at first, as the general bruising causes bilateral paralysis.

REFLEXES. PUPIL: Dilatation produced by pinching side of neck. SCAPULAR: Scratching skin over scapula causes muscles to contract. SUPINATOR: Tapping tendon at wrist causes flexion of arm. TRICEPS: Tapping elbow tendon causes extension of arm. POSTERIOR WRIST: Tapping tendons causes extension of hand. ANTERIOR WRIST: Tapping tendons causes flexion of wrist. PALMAR: Scratching palm causes flexion of fingers. EPIGASTRIC: Stroking mammae causes retraction of epigastrium. ABDOMINAL: Stroking abdomen causes retraction. CREMASTERIC: Stroking inner thigh causes retraction of scrotum. PATELLAR: Striking patellar tendon causes extension of leg. GLUTEAL: Stroking buttock causes dimpling in gluteal fold. PLANTAR: Stroking sole of foot causes flexion of foot and retraction of leg. ANKLE CLONUS: forcible extension causes rhythmic flexion.

searches in physiology, the introduction of anæsthetics and anti-septics, the wonderful inventions in mechanical art present a most urgent appeal to the thoughtful surgeon to devote more attentive study to the management of these cases. The "do-nothing" plan terminates in death, the application of well-recognized surgical principles to this peculiar class of hitherto neglected cases has demonstrated the possibility of salvation in at least a limited number. The writer, in his paper this evening, will restrict himself to a consideration of traumatism of the spine and cord, and he will also limit himself to the subject of the treatment by the plaster-of-Paris jacket.

Traumatisms of the spine and cord include fractures and dislocations, hæmorrhage, gunshot wounds, laceration, severance, suppuration, secondary changes, such as myelitis, meningitis, and pressure by inflammatory exudates.

If *direct violence* is applied to the spine a fracture usually results. The *seat* of the fracture has much to do with the prognosis, since a fracture of the processes is of less gravity than a fracture of the body of the vertebræ. Owing to the great prominence of the processes of the cervical vertebræ, it has been shown that more than one-half of the cases of fracture of this segment of the spine belong to the processes rather than to the bodies, while more than two-thirds of the fractures in the dorso-lumbar region belong to the bodies of the vertebræ instead of the processes. On the other hand, it must be remembered that the nearer the fracture is to the medulla the greater the dangers both immediate and remote. In all fractures of the spine, irrespective of the situation, the question of injury to the cord itself is the key to the prognosis.

In a general way it may be stated that a fracture above the third cervical vertebra terminates instantly in death from pressure of the odontoid process into the cord or paralysis of the phrenic nerve. A fracture occurring in the dorsal region usually terminates fatally in about three weeks from hypostatic pneumonia, while a fracture in the lumbar region usually leads to death in about three months on account of renal trouble.

The *signs and symptoms* of fracture of the spine vary ac-

according to the *amount of compression* to which the cord is subjected. They also vary according to the *seat* of the fracture. If the cord is not compressed, the signs of fracture of the spine are chiefly local. This condition may occur in fractures of the processes of the vertebræ. The localized point of tenderness, the ecchymosis, the swelling, the irregularity in the line of the spinous processes, the pain, the inability to move, the crepitus, the loss of the natural contour of the back, and the depression over the injured spot, all serve as evidences of the existence of a fracture.

If, on the other hand, the cord is compressed by the fragment, the symptoms are characteristic, among which, in addition to those already mentioned, are loss of motion in those muscles which are supplied by nerves passing through the seat of lesion and anæsthesia in the part correspondingly supplied, and a small area of hyperæsthesia upon the back just above the lesion. The writer has prepared, with considerably difficulty, a chart which will enable the surgeon at a glance to locate even to the numerical vertebra the precise seat of fracture in the spine, so that the diagnosis can be established upon a scientific, anatomical, and neurological basis.

If *indirect violence* is applied to the spine a dislocation is likely to occur, especially in children. The cervical region is more frequently the seat of a dislocation than the dorso-lumbar region. Dislocations are caused by suddenly bending the spinal column backward, or by striking the head in diving, or by forcibly bending the spinal column forward, as in passing under a low arch. If there is any compression of the cord, the signs and symptoms are similar to those observed in fracture. *Hæmorrhage* may occur as a result of traumatism, and the extravasated blood may be found between the dura mater and the bony walls of the spinal canal or beneath the dura mater, or even in the substance of the cord itself.

The *symptoms* of spinal meningeal hæmorrhage are sudden, acute, and very severe pain in the back and limbs, accompanied by numbness and prickly sensations in the feet. These symptoms are very quickly followed by impairment of motion in the

limbs and subsequently by paralysis and anæsthesia. This group of symptoms appears in the general order mentioned a short time after the injury. There is an appreciable period between the traumatism and the appearance of the symptoms.

The *symptoms* of hæmorrhage in the substance of the cord develop more rapidly than those of hæmorrhage in the meninges, and the symptoms, too, are more pronounced. In a meningeal hæmorrhage the pain is very severe, paralysis is not so prominent, and muscular spasm is more pronounced than when the hæmorrhage is situated in the cord itself.

These cases of fracture and dislocation and of spinal hæmorrhage are benefited by the use of the jacket. The fixation of the spine relieves the pain and keeps the parts quiet during the repair of the fracture or the partial absorption of the extravasated blood. If the lesion is in the cervical region, the prospects of recovery are not so favorable as is the case when the hæmorrhage is in the lumbar region.

Gunshot wounds of the spine and cord are attended by a high rate of mortality, which is influenced by the situation of the injury. The higher the injury in the cord the higher the rate of mortality. Thus in the war of the Rebellion the death-rate in gunshot injuries of the cervical region was 70 per cent., in the dorsal region 63.5 per cent., in the lumbar region 45.5 per cent. The introduction of antiseptic surgery will lessen this high rate of mortality; but it will only affect the diminution as regards sepsis.

The *symptoms* of gunshot wound of the vertebra and cord are those which are common in any other variety of injury of the spine and cord, with, perhaps, additionally an aggravated condition of shock. The back is motionless, paralysis, anæsthesia, and hyperæsthesia with lightning pains of a growing, girdling nature, are present, as also difficulty in respiration, in circulation, in micturition, and in defecation. There is also present a tendency to the development of trophic gangrene, and, finally, there is an escape of cerebro-spinal fluid in case the meninges are wounded. If the bullet has not penetrated deeply into the bony structure of the vertebral column or wounded the cord, many of the signs

just mentioned may be present as a result of contusion of the cord producing a slight laceration. These symptoms are of temporary duration, and soon subside, leaving behind them no disagreeable after-effects. The presence of so much fluid in the vertebral canal make cases of contusion and concussion less frequent than corresponding injuries of the brain.

In military practice the prognosis in gunshot wounds of the spine and cord is very grave, as high as nine-tenths of the cases have died within a few days following the injury. If the bullet wound is in the cervical region the mortality is very high. Whereas, if the wound is in the lower lumbar or sacral regions, a few recoveries have been reported, asepsis will lessen the high rate of mortality; but it will have no appreciable influence in the death-rate over such factors as shock, hæmorrhage, and injury to internal viscera. If a patient recovers from the immediate effects of the injury, there is sure to follow a train of most distressing symptoms, such as atrophies, contractures, neuralgic pains, ataxia, disturbances of the function of the brain, cord, and bladder, as well as meningeal thickenings and scleroses.

Laceration of the cord, either with or without fracture or dislocation, occurs as a result of traumatism. The laceration may be limited or may be very extensive, and the secondary changes, such as softening and myelitis, make the prognosis most serious.

Spinal meningitis occurs as a result of pressure in fractures and dislocations, and also from gunshot injuries. A spinal meningitis may also have its origin from extension of sepsis, from a bed sore, and from caries, giving rise to psoas or lumbar or cervical abscess. The symptoms of spinal meningitis following injury are paralysis, anæsthesia, hyperæsthesia, girdle pains, spasm of the muscles, nausea, vomiting, convulsions, chills, elevation of temperature, rapid pulse, delirium, cystitis, pyelitis, and nephritis.

Myelitis occurs as a result of the same causes, and many of the symptoms are in certain respects common; although they are as a class much less severe. The function of cord is lost earlier than in spinal meningitis, the pain is not so severe,

the chill is usually absent, the temperature is not so high; but urinary troubles and inflammations tending to gangrene are often present.

In both *spinal meningitis* and *myelitis*, consecutive to traumatism, the symptoms are present, which the application of the jacket will greatly relieve, and in some cases cure. In the list of cases of injury to the spine and cord, spinal meningitis and myelitis have been present, and yet the patients have been practically cured.

In traumatism of the spine, where the cord shows symptoms of pressure myelitis, a differential diagnosis must be made between the compression made by *continued pressure which is not relieved*, and a compression of the cord made by the vertebra in which a recoil has taken place. In the former case the prognosis is exceedingly serious, while in the latter the prospects are not so unfavorable. In the *cervical* region a displacement with recoil is more common than permanent displacement and consequent pressure.

Burrell has demonstrated the important clinical fact that, "where the bodies of the vertebræ were displaced upon themselves, the cord not being torn, a pressure lasting twenty-four to forty-eight hours upon the cord was sufficient to produce irremediable softening."

The *treatment* of all these different varieties of traumatism of the spine and cord by the plaster-of-Paris jacket has met with brilliant results. Before the employment of the jacket these cases were doomed to unalleviated suffering and death. The jacket in gunshot injuries affords a means of fixation after laminectomy, or if laminectomy is not performed, a means of preventing a certain amount of pain, as well as certain inflammatory sequelæ. In laceration of the cord the use of the jacket cannot be too highly extolled, since there are many cases in which the jacket has proved itself of very great benefit in this variety of traumatism. In spinal meningitis and in myelitis the cases of recovery are numerous where the jacket has been employed in Pott's disease. There is no reason why the same brilliant results should not follow the application of the jacket when used in

connection with spinal meningitis or myelitis secondary to traumatism. The same beneficial results should follow in both cases.

There is nothing new in the technique of the application of the jacket in the cases of traumatism of the spine and cord, except that extension and counter-extension must be employed in a different manner from that in which it is used in the treatment of Pott's disease, or even in lateral curvature, since in both of these conditions the patient can be suspended. In traumatisms of the spine the danger of this method in recent cases needs no comment, as sudden death can occur by displacement of the fragments in attempts to place the patient in the vertical position. The tripod may be used later after bony ankylosis has occurred, but its use even then is attended with danger, and its application immediately upon the receipt of a fracture is to be condemned.

There have been several methods employed to accomplish extension and counter-extension in the application of the jacket in cases of spinal injuries.

Davy employed extension by placing the patient upon a piece of canvas, about fifteen feet long and two feet wide. The patient was wrapped in this hammock and suspended while the plaster jacket was applied.

Berkely Hill placed his patient upon a board, which was swung upon two pivots like a mirror. The patient was then placed vertically by raising the board to an upright position.

Sayre has used the tripod in order to effect extension, while other surgeons have employed compound pulleys. The writer has fastened the patient upon two stretchers, and placed them end to end. The stretchers are then pulled apart, and the plaster jacket applied to the chest in the space left by the separation of the stretchers.

Stewart has suggested an improvement upon the stretchers by employing two ordinary kitchen tables, which are separated in the same manner as already described. Extension and counter-extension are maintained by several assistants, who are placed at the feet and the head of the patient. This extension is continued until the plaster has set. Perforated strips of sheet-iron or zinc or tin can be used after the manner of stays in a

corset, and their employment prevents any shortening of the trunk after its hyperextension.

The use of an iron stand to support the back while the plaster is applied is of great service, since it prevents any sinking of the vertebral column at the seat of the special injury. The advantage of this stand is at once apparent, since the danger of compressing the cord is overcome by the use of this mechanical support. The entire back is supported by the parallel bars which pass up each side of the spinous processes.

The requisite time to accomplish a cure by the use of the jacket is subject to variation. It is seldom that any benefit will be derived unless the use of the jacket is continued for many months. The application of the jacket for a few days is of little avail, and its use should be extended over many weeks, during which time, however, the formation of bedsores must be carefully guarded against, since the conditions are especially favorable for their development.

In the application of the jacket it is most important that the best plaster of Paris should be used. Inferior plaster will not set quickly enough, and the usefulness of the splint is destroyed. The surgeon should bear in mind the possibility of sudden death during the application of the plaster, and he should exercise every possible precaution to prevent such an unfortunate accident.

The results which have followed the use of the plaster-of-Paris jacket are most gratifying, when it is taken into consideration that these cases formerly terminated in death.

The writer desires to refer to a case of fracture of the lower cervical vertebra, which occurred in the practice of the late Dr. James R. Wood, in 1877. This patient sustained a fracture of the cervical spine, which was attended with loss of motion and sensation of both upper and lower extremities and also the trunk. Vesical and rectal paralyses were also present. The patient was encased in a plaster-of-Paris jacket some ten days after the injury, and in a few weeks the symptoms were greatly relieved, and eventually the patient fully recovered. He was subsequently present at my clinic and seemed perfectly well, and had resumed

his usual work as a carpenter. The photograph of the patient illustrates the method which was employed. (Figs. 1 and 2.)

There is another case of fracture of the spine with loss of motion and sensation, together with the other symptoms, in which recovery has occurred from the use of the jacket in my own hospital service. This patient has kindly consented to be present this evening in order to show how well he can walk, and, although he was confined to a water-bed for six months, and motion and sensation were both absent and vesical and rectal trouble present, he is practically well and has resumed work.

The writer has been able to collect thirty-three cases of recovery after unmistakable fracture of the spine. Many other cases have been eliminated in which improvement only was noted. This list is sufficiently large to attract the attention of surgeons and to induce them to employ this method of treatment in all forms of traumatisms of the spine and cord.

Burrell has reported 8 cases; Dennis, 1; Dandridge, 2; Gibney, 2; Keetley, 1; Hill, 1; Harrison, 1; König, 1; Sayre, 13; Wood, 1; Woodbury, 1; Gerster, 1. Total, 33.

To this list of satisfactory cases many others can be added in which *improvement* in all the symptoms is recorded, and also another long list in which the jacket has been a valuable adjuvant after laminectomy. Still again, the usefulness of the jacket is demonstrated in a large list of injuries, among which may be mentioned sprains, concussion, hæmorrhage, lacerations, and inflammatory thickenings.

Thus it is evident that *immediate extension* and *counter-extension* with immobilization by means of the jacket in all forms of spinal injuries offers the most satisfactory plan of treatment that has as yet been suggested, a plan of treatment, too, in which the results are such as to leave little to be desired, and a plan of treatment further that has been attended with a most unprecedented success.

Before dismissing the subject of the treatment of spinal injuries, too much stress cannot be laid upon the great importance of preventing cystitis, which in turn establishes a pyelitis, and eventually leads to death. The operation of perineal cys

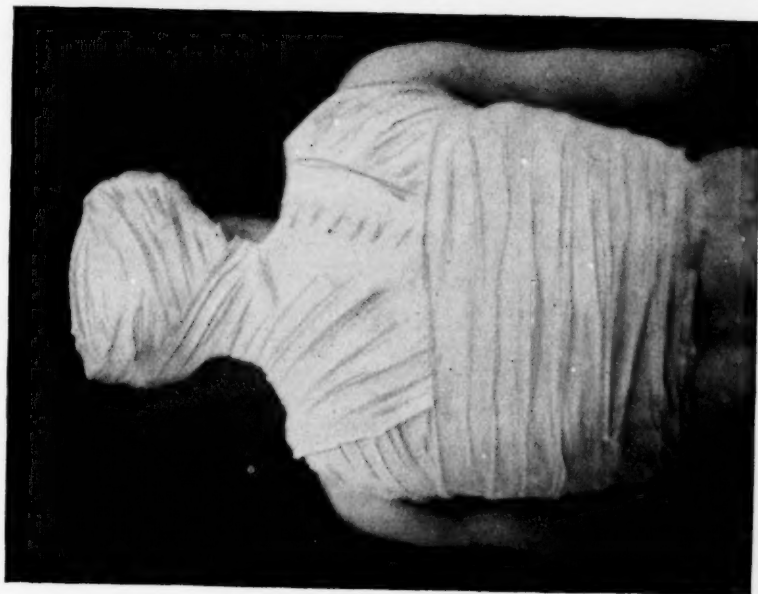


FIG. 1.—POSTERIOR VIEW.

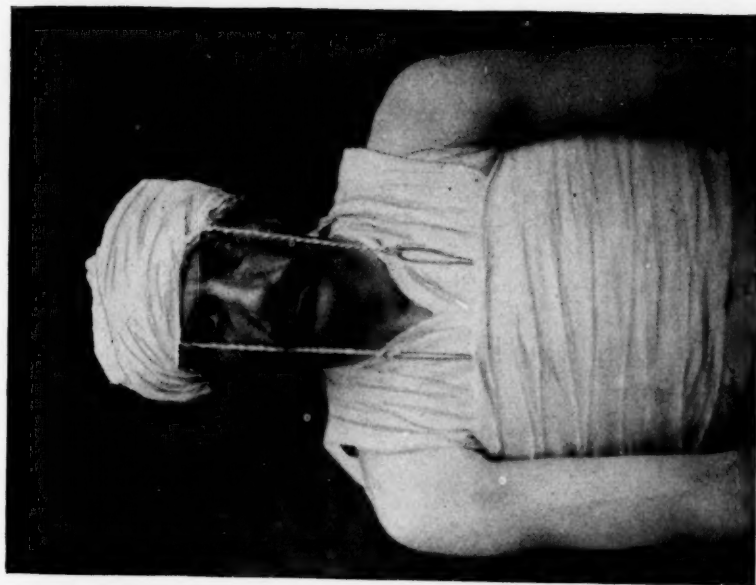


FIG. 2.—ANTERIOR VIEW.
Patient with fracture of spine in the cervical region, showing application of jacket.

tomy has been performed a number of times in fractures of the spine by Mr. Darrier Harrison, who inserted a rubber lithotomy-tube into the bladder through the perineum and attached to the tube a piece of India-rubber tubing, which carried the urine from the bladder to a vessel upon the floor. By this means the urine was not permitted to collect in the bladder, and the parts about the genitals were kept free from excoriation. The bladder was washed out twice daily by antiseptic solutions. Two sets of tubes were employed for each case, so that when one set was in use for twenty-four hours the other set was washed in hydrochloric acid, and kept standing in a solution of bichloride of mercury. In this way the bladder was kept free from cystitis, the perineum and buttocks dry, and bedsores avoided. If the perineal cystotomy is not performed, the rubber catheter should be boiled each time before introduction and immersed in an antiseptic solution at the time.

The conclusions to which the writer has arrived, after carefully studying the histories of many reported cases and from his own clinical experience with a very large number of cases of traumatisms of the spine, are as follows:

Traumatisms of the spine, either with or without compression of the cord, should be immediately subjected to extension and counter-extension, and then immovably fixed by the plaster-of-Paris jacket.

The situation of the fracture in the cervical region, but below the fourth cervical, seems to have no special influence in regard to the benefits to be derived from the use of the jacket, since recovery has followed fractures of the lower cervical vertebræ as well as in those cases in which the fracture was situated in the dorsal and the lower lumbar regions.

The most unpromising case is not to be deprived of the benefits of the jacket, since cases have recovered which have been considered beyond the reach of surgical aid.

The usefulness of the jacket is greatly enhanced by the administration of the iodide of potash in moderate doses at first, and subsequently increased to very large doses three times daily. The drug must be pushed to the extreme and continued without interruption for several weeks.

Cases of injury of the spine in which well-marked symptoms are present and have existed for some time have been greatly improved and in some cases cured by the jacket, so that its use with a hope of success is not alone confined to those injuries which are very recent.

The plaster-of-Paris jacket is a most useful adjuvant for immobilization of the spine after the operation of laminectomy, and under these conditions great benefit is to be derived from this method of after-treatment.

SUGGESTIONS' FOR A PORTABLE INSTRUMENT-
BAG; OPERATING OVERALLS; A BANDAGE FOR
SUPRAPUBIC DRESSINGS; A BLANKET FOR
PROTECTION OF PATIENTS DURING OPER-
ATIONS; A TABLE FOR THE TRENDEL-
ENBURG POSTURE; THE STERILI-
ZATION OF SPONGES; AN ANTI-
SEPTIC SOAP PASTE.

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THE first among a number of original additions to the practical side of surgery, which I beg to offer, is an operating outfit. In presenting the same, I desire to state that the idea of planning an outfit which would meet the approval of every surgeon had never entered my mind. It is more to the general principles involved in the construction of the case than to the instruments that the attention of the reader is invited; for every surgeon will have his likes and dislikes, for and against certain instruments, or against a certain number of instruments which are to constitute such a case.

The principles which should be embodied in an ideal operating case are those of completeness, convenience, portability, and cleanliness; it should be complete in its equipments,—*i.e.*, in keeping with the individual idea of the surgeon; it should be convenient in its arrangement, portable as to its size, and of such construction as to admit of its being kept in a practically sterile condition, that it may at all times be ready for use.

The average bag may possess one or more of these features,

but it is usually deficient as to the number and variety of instruments, or *vice versa*, it is encumbered by an excess in the number of instruments, adding so much weight, that its convenient portability is seriously interfered with.

But a more serious objection than either of these is the difficulty with which the average bag can be kept in a practically sterile condition, and it was to this feature that the most attention was directed in the construction of the present bag.

Upon examination it will be noticeable that everything, with the exception of the satchel itself, can be subjected to heat,



FIG. 1.—External appearance of the operating outfit.

the most potent of all disinfectants. As for the convenience and completeness, that will be left for the reader to decide after reviewing the description and examining the plates, and as to its portability, I will say that it has been upon probation for about two years, during which time no inconvenience was experienced in its transportation.

Illustrative of the capacity of the bag might be added that not long since the writer had an occasion to visit a neighboring State to operate upon an obscure abdominal condition, and in view of this fact a number of unnecessary articles were required to insure a complete outlay.

In the space above the instrument-case, or, in other words, between the box and the lid of the satchel, were carried almost

a dozen smaller instruments, in addition to this, one dozen towels, eight sponges, two extra gowns, an irrigating outfit, and a hypodermic case.

The bag is ordinarily known as the fifteen-inch size. The external appearance, together with the manner of carrying the operating overalls, can be observed in Fig. 1.

Upon opening the bag, the utilization of its space, the convenience of its arrangements, and the ease of its sterilization can be seen at a glance.



FIG. 2.—Showing interior arrangement of the operating outfit.

The cover, which consists of halves, is supplied upon its inner sides with leather slots for the respective articles. An idea of their character and arrangement can be obtained by a study of the plates.

Upon one-half of the cover nine distinct articles are carried, as follows:

(1) A bottle containing rubber tissue; (2) a bottle containing rubber drainage-tubes; (3) a bottle, encased in wood, containing decalcified bone drainage-tubes.

In the middle there is arranged upon a folding plate three sizes of the Murphy buttons,—

(1) A razor protected by a case made of heavy duck; (2) a nail-brush enclosed in a case of duck; (3) a mouth-gag.

The opposite half is provided with slots for eleven articles; beginning at one end, we have five bottles,—

(1) Containing tincture of digitalis; (2) containing permanganate potash; (3) containing oxalic acid; (4) containing ethereal solution bichloride, of such a strength that every four drops represent one grain of the salt; (5) a bottle containing sal-soda.

The next slot has a small box made of German silver and heavily nickel-plated, for carrying needles and twenty strands of silkworm gut. Following this is another box made of the same material, and likewise plated; in this is carried a rubber tourniquet; then comes a box, in which are stored two dozen each of small and medium-size safety-pins. The list is completed by a



FIG. 3.—*a* Aseptic removable lining of the satchel.
b Aseptic box for storing the instruments.

dusting-box of my own design, and, finally, two glass jars with metal screw tops.

In the one is carried castile soap shavings, while the other holds iodoform gauze wrapped upon a reel made of German silver.

The whole kit is protected within the satchel by a shell made of heavy duck, which is kept upright and in a snug position by the means of nickel-plated rods. Each case should really possess a duplicate shell, which is always kept sterilized and ready to take the place of its fellow while it is being cleaned.

The instruments, which with the exception of the handle of a Coghill's modified Hey's saw, are entirely metallic and of the simplest construction, are arranged upon two German-silver frames within a box of the same material, the inside corners of which are carefully filled out with silver, and both the lid and box itself are intended to serve the purpose of immersion-trays, if the occasion should demand. The whole of this is nickel-plated and highly polished. The box and the frames are soldered by means of silver, which enables them to withstand considerable heat if it should be necessary. The lower frame

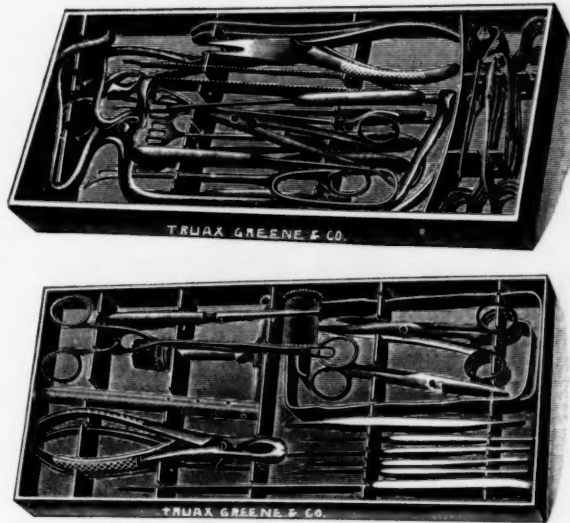


FIG. 4.—Racks for holding the instruments.

is shouldered upon its upper border, which serves as a rest for the corresponding frame above.

The upper frame holds the following instruments: Liston's long knife; Cooper's hernia bistoury; scalpel, small amputating knife; tenotome, periosteal elevator; two blunt retractors, each of double size; one straight scissors and one curved; one straight Allis's acupressure forceps; one broad hæmostatic clamp; one short hæmostatic clamp; one curved scissors, bone forceps; one rongeur, Eastman's aluminum drainage-tube; trephine, one bullet forceps; one Coghill's modified Hey's saw.

The lower rack holds : Eight Tait's hæmostatic forceps ; one groove director, probe, tenaculum ; one vulsellum forceps ; one sequestrum forceps ; two double-size Volkmann's spoons ; two sponge-holders ; two curved pedicle needles ; one Windler's adjustable saw with an extra blade ; one renal hæmostatic clamp (Schachner) ; two sharp retractors ; one needle-holder ; one long needle for suturing abdominal wounds ; one lithotomy staff.

There are several other features in connection with the outfit which merit special attention, one of which is the cleansing of the instruments.

Perfectly bright instruments are the exception rather than the rule in the majority of instrument-bags ; for it is next to

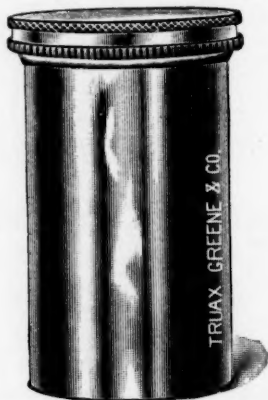


FIG. 5.—External appearance of the ligature reel.

impossible to keep instruments in a highly polished condition for any length of time, if the polishing is done with towels, as it is usually carried out. The quickest, easiest, and best method of polishing instruments is by means of an ordinary jeweller's buffing lathe. This can be procured at a small expense, and will amply repay the possessor in the time and labor that it saves, and the results that it secures. The needles frequently become spotted and sometimes rusty. Whenever this occurs, they are best restored by a little rubbing with fine emery cloth, which can also be used upon the instruments when spotted with rust, which resists the rubbing with moistened pumice stone.

Of all the difficulties in connection with an outfit, there is none so perplexing as the method of carrying suture and ligature material, and it was only after a long and patient study that the one about to be considered was effected. It has now been in constant use for about two years; during this time it has fulfilled the most sanguine expectation.

Upon examination of the text and illustrations, its construction will be apparent.

Fig. 5 represents the external view of the whole complete.

Figs. 6 and 7 represent the inverted view of the interior mechanism of the same.

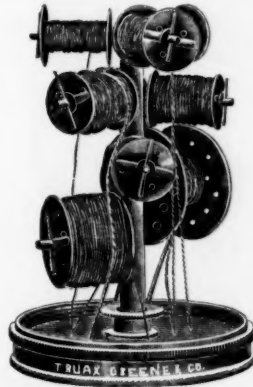


FIG. 6.—Interior arrangement of the ligature reel. Inverted.

(B) The immediate cover of the case. This is supplied with nine perforations for the transmission of the ligatures. Upon its upper or external surface it is plain, with only the perforations and ligatures visible. Against its lower or internal surface rests a rubber disk through which the ligatures are drawn, and which is intended to prevent the leakage of any fluid through the perforations.

(C) Which corresponds with the rubber disk, is held in place at the central point by the flange of the cylindrical section of D.

At its edges it is held by its impingement between the walls

of the container from below and the internal cover of *B* from above.

(*D*).—The cylinder is supplied with threads internally and flanges at its top and bottom. The threads upon its interior, located near the top, are to receive corresponding threads from a short peg arising from the cover of *B*. (Not seen in the plate.) Those near the bottom receive the threads upon the central stem of *E*, and firmly hold it in position. The upper

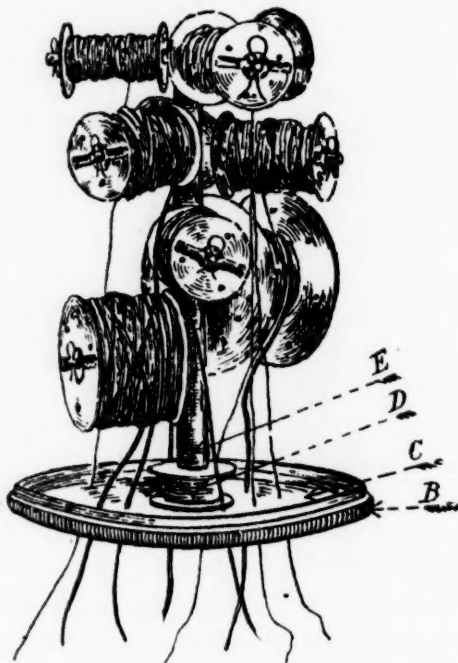


FIG. 7.—Interior mechanism of ligature reel.

flange holds the rubber disk *B* firmly against *A*, and the lower flange performs the functions of a thumb-screw, to be used in adjusting the same.

(*E*).—The central rod gives support to the respective reels, which are held upon their axles by a curved piece of silver wire, performing the function of dowel pins.

As for charging the reel, this is usually effected by the

selection of three sizes of silk; the plaited silk to be used for pedicles, the medium-size silk for pedicles, sutures, and for any other use that may arise, and a third variety, of a very fine character, to be used for intestinal work. The catgut has sizes to correspond with the silk and for the corresponding purposes. In the preparation of the sutures the silk is not subjected to any preliminary handling. The catgut, however, is laid in two successive washings of ether for thirty-six hours each time; to dissolve away the fatty element that interferes with its sterilization. It is then wound upon the proper reels, and the container is filled with absolute alcohol until all the reels are submerged. The whole is then placed in boiling water, and sufficient heat applied to keep the alcohol in a boiling state for about one minute. This is again repeated in twenty-four hours. It is then ready for use, and the container should not again be opened until the reels require replenishing.

In washing the catgut to remove the fat, the ether has been replaced by benzine, but not with the same satisfaction.

Just before beginning an operation, all the strands are slightly drawn out, in order to expose a sterile section of the ligature, and that part that has been exposed is cut away to insure perfectly safe material. Truax, Greene & Co., of Chicago, have undertaken to supply duplicates of this outfit, as described.

Operating Overalls.—The protectives usually worn by operators are open to many objections. Generally the protectives consist either of rubber aprons or gowns, or a combination of a jacket, similar to the kind worn by barbers, and a rubber or linen apron.

The fault to be found with rubber aprons is not alone in the cost of the material and the frequency with which it requires to be renewed; but also in the imperfect manner in which they cover the operator and in the difficulty with which they can be sterilized. For ordinary purposes the white jackets and linen aprons are desirable, in view of their cost, durability, and cleanliness. The objections open to them are that occasionally the operator requires the use of large quantities of water, which, notwithstanding the greatest care, can hardly be managed without

saturating the operator as well as the patient. These objections, however, are overcome by the operating overalls which accompany the outfit.

Upon noticing the plate (Fig. 8), it will be seen how completely the operator is protected from any water or fluids that he may come in contact with during the operation; and from the character of the material of which they are constructed, it is easy to see how readily they can be kept neat, and how they can be kept sterile.



FIG. 8.—Appearance of operating-overalls.

They are prepared somewhat after the under-garments usually worn by children. In the front they are completely closed, while behind they are supplied with a row of buttons extending as far as to a point corresponding to the upper part of the sacrum.

In selecting the quality of duck for making such overalls, care should be taken that too light a grade is not obtained, since, should such be the case, they will hardly possess the necessary

water-proof qualities. Although, owing to the heavy grade of duck, they may be stiff and inconvenient at first, they soon become softened after a few washings.

Suprapubic Bandage.—The bandages and dressings that have been recommended for abdominal sections are both numerous and varied; ranging from the simple abdominal binder to the more complex Scultetus bandage.

Somewhat more than a year ago, the writer performed an oöphorectomy upon an extremely restless patient, whose behavior after the operation was such that no dressing could be satisfactorily kept upon the wound. The only protective that was finally employed consisted of several applications of Liq.

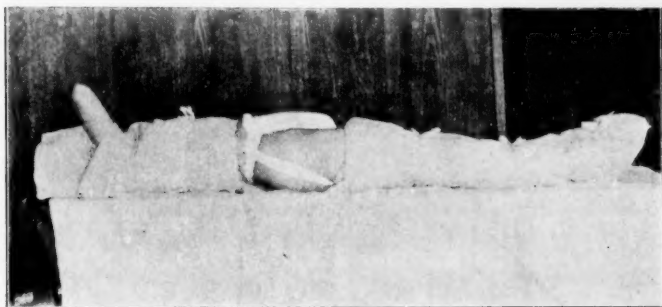


FIG. 9.—Showing the application of the suprapubic bandage and the operating blanket.

gutta-percha, U. S. P. This experience became a pressing incentive for the contrivance of a more satisfactory dressing for abdominal sections performed between the umbilicus and the pubes; and from these efforts resulted the bandage seen in Fig. 9.

Among the advantages of this bandage may be mentioned the cost, since when once used it need not be cast aside, but can be washed and cleaned just like towels and other fabrics.

A second advantage is the ease of its application and the convenience of its adjustment. Finally, it is advantageous in affording the greatest facility for observing and combating the presence and the progress of any distention that may arise during the post-operative period of the case.

The bandage consists, as seen in Fig. 10, of a pad, with tails corresponding to its four corners. When applied, the upper tails snugly encircle the abdomen just above the iliac crests, while the lower pass over the perineum and are pinned to the corresponding side of the encircling band. By means of this bandage the dressing is always kept firmly and evenly applied; since laterally there is no tendency for any displacement, and the perineal bands securely anchor it above and below, preventing the slipping in any of these directions. Should the case require the use of a drainage-tube, a slit can be made in the pad corre-

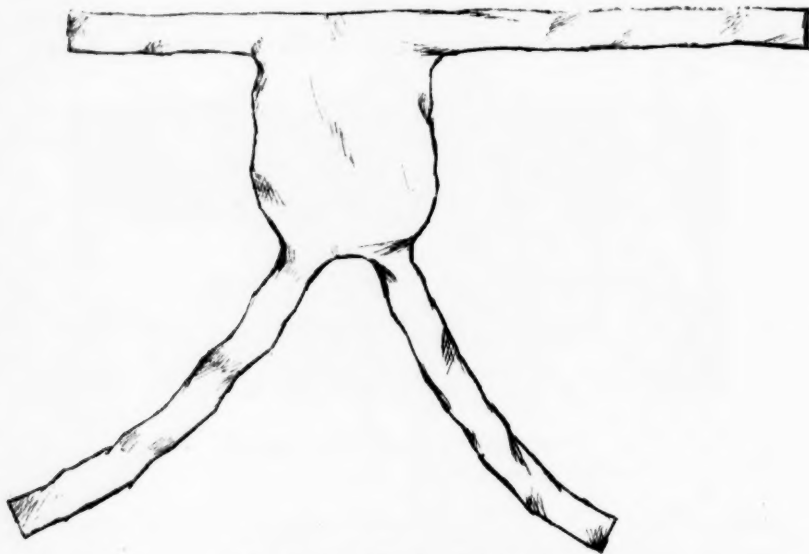


FIG. 10.—Design of suprapubic bandage.

sponding to the position of the tube. In case the operation necessitates an incision extending above the umbilicus, this bandage can be modified to answer the requirements by an extension upward of the pad. This upper-half is held in position by a second abdominal band. The bandage thus modified, however, is not as satisfactory as the one used for suprapubic operations.

Operating Blanket.—It is needless to comment upon the necessity of protecting the patient as much as possible from shock produced by unnecessary exposure to cold and moisture;

and to properly fulfil this requirement is not always as simple as it appears. Not infrequently do we see a patient almost buried beneath a lot of blankets and sheets, arranged in the clumsiest and most inconvenient manner. For a time the writer resorted to the use of leggings and a jacket made of the so-called "silence cloth," as protectives for the patient during the operation. Experience soon demonstrated their impractical nature. Being of

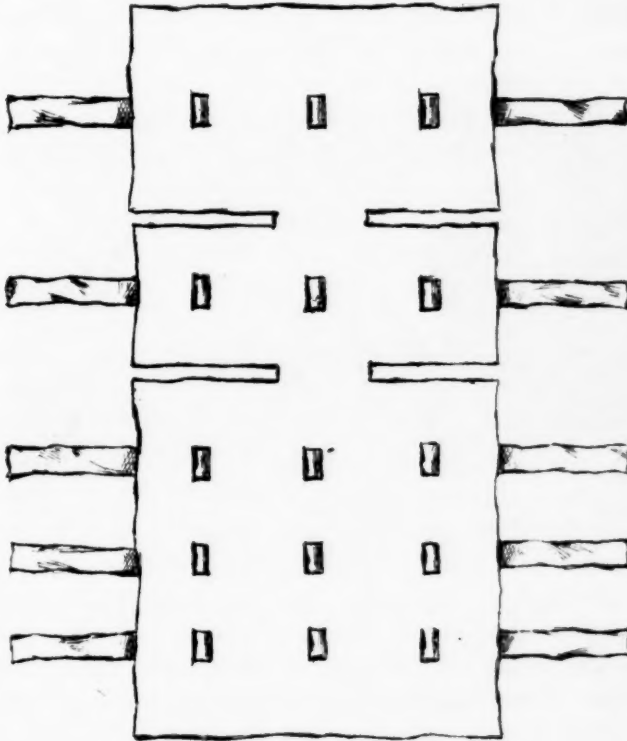


FIG. 11.—Design of operating blanket.

one size only, it was not an uncommon occurrence to encounter subjects that were either too large or too small for a convenient fit. This obstacle was overcome by the use of a blanket, made adjustable to any patient, or to any part of the patient. The design of the blanket can be seen in Fig. 11, and its application in Fig. 9. In the illustration, it is to be observed that it consists

of three flaps, which respectively correspond to the thorax, the abdomen, and the lower extremities. The untying of either of these flaps exposes the corresponding region of the patient. It may be desirable to expose but one leg, in which event the lower flaps are to be wrapped around one, instead of both legs.

Trendelenburg Posture.—One of the most valuable of the recent additions to practical abdominal surgery is the Trendelenburg position. It adds to the safety of the anæsthesia, it militates against shock, and allows the surgeon to perform operative steps under the direct guidance of the eye, which formerly were prac-

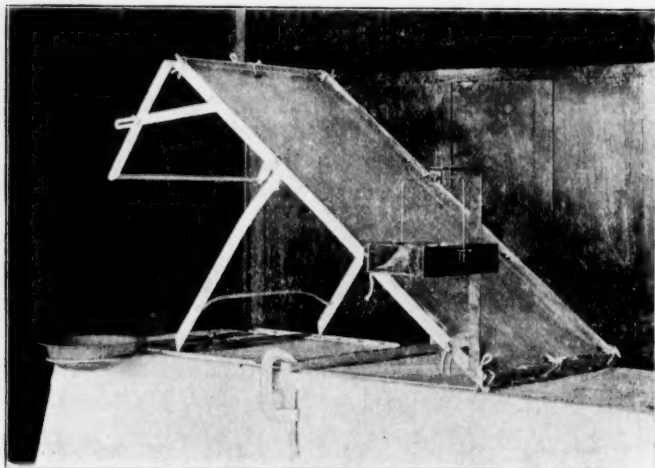


FIG. 12.—Modification of Krüg's Trendelenburg table.

tised by the touch alone. There are hardly any contraindications to its use in operations involving the lower abdominal and pelvic regions.

In pus cases, the position must be carefully employed, lest some escaping pus should infect the entire peritoneal cavity. In such instances it is found best to avoid the elevation, unless the pus is securely enclosed in the Fallopian tube, which can be removed without rupture, or unless the greater portion of the pus has previously been removed by aspiration.

In large abdominal tumors it is always best to keep the

patient in a horizontal position until the tumor has been delivered. Then the patient should be rapidly elevated to avoid any cerebral anæmia which may follow after the sudden removal of a large mass from the abdominal cavity. The necessity of observing this precaution has been demonstrated by actual experience. Some time ago I operated upon a hospital patient who had a large fibromyomatous tumor. The pelvis was elevated about forty degrees, but the woman was not long in this position before the breathing became unnatural and ceased entirely. She was lowered and artificial respiration performed, which restored the breathing. The tumor was delivered and the pelvis again elevated to the same degree for the completion of the operation.

The term "Trendelenburg posture" is used with as much looseness as the expression "antiseptic precautions." For it is not an unusual occurrence to hear of cases reported to have been operated upon in this position, in which the pelvis was elevated but a few degrees to the horizon. Nay, even more than this, we have seen tables of special construction in which the extreme elevation did not exceed more than twenty-five or thirty degrees, instead of forty-five and sixty, as it should have been.

In the accompanying Fig. 12 is seen a modification of Krug's portable Trendelenburg table. The principal difference between this and the one suggested by Dr. Florian Krug is the attachment of the swinging instrument tray and an adjustable ring for the reception of the basin containing the antiseptic solution. These attachments have added largely to the convenience of the table. Upon the right side of the operator are his instruments in a swinging tray; on the left is the ring for holding the basin which contains the antiseptic solution. This ring is under the control of the thumb-screw, which allows it to be pushed forward and backward as may be desired.

Sponges.—There has been a considerable difference of opinion as to the best material for sponging wounds, and with those surgeons who prefer sponges there has been some variance as to the preparation and kind of sponge to be preferred. The kinds usually employed during an operation are the surgeon's silk and the flat or potter's sponge.

In addition to these the author has used with advantage a

third variety, known as the zimmoca sponge. Occasionally, in performing a "planned" operation for an abdominal tumor, it becomes necessary to flush the cavity with large quantities of water. In such instances the saving of time is always of the greatest desideratum, and considerable time can be saved by the use of a good-sized and properly-disinfected zimmoca sponge. Its bulk and extreme absorbing capacity render it especially useful in "bailing out" the abdominal cavity. In addition, a sponge of this size and character has been found useful in rapidly packing a small cavity to absorb any capillary oozing and any pus or secretion that may be encountered during the progress of the operation.

It has been a custom with me never to use the same sponge or set of sponges twice, for it has always seemed very illogical that we should lay down hard and uncompromising conditions for the construction of a surgical instrument,—*i.e.*, simplicity; and that we should recognize but one agent as possessing sufficient potency for the proper sterilization of the instrument,—*i.e.*, heat; and still find justification for the repeated use of the same sponge, even though it be treated by any of the recognized methods. In its structure it is a direct violation of the first condition, and from its nature it is unfitted to be exposed to heat for its sterilization.

The question of cost may be raised against the practice of using sponges but once. This objection, however, depends entirely upon the kind of sponge selected, for it would be an expensive practice to use a fresh lot of silk sponges for every surgical operation. The cost of using sponges but once can be reduced to the minimum by employing the so-called "grass sponges." This is a cheap but a very excellent variety of sponge. In texture it is not as strong as the silk sponge, but it is sufficiently strong, even after passing through a bleaching process, to answer all the purposes of a single operation; and in regard to its softness and absorbing powers it is fully equal to the best silk sponge.

The plan which I have pursued for some time has been to use nothing but carefully-prepared grass sponges. In preparing these sponges, they are properly selected and freed of any traces of sand and *débris* that they may contain. They are then washed

and bleached either by the use of chlorine water or more conveniently by the successive baths of permanganate, oxalic acid, and hyposulphite of soda.

It must be remembered that any sponge is weakened by passing through a bleaching process; and this is all the more to be borne in mind in the preparation of the grass sponges.

It is also very important to carefully avoid the use of a strong solution of permanganate of potash, which has a destructive effect, not alone upon the organic impurities in the sponge, but also upon the texture of the sponge itself. Finally, a large number should not be prepared at one time, for, when they are kept long after having been bleached, they show the destructive effect of the permanganate.

Soap Poultices.—There is hardly a more unsatisfactory feature about an operation than the usual soap poultice. The principal reason for this is that the soft soap that is generally found in the market is prepared by those who have had but little or no experience of practical soap-making. The consequence is that a perfectly neutral compound is very seldom obtained, for, usually, the finished product contains an excess of alkali, which makes it very caustic for the purposes of a poultice.

In fact, I have more than once ordered a soap poultice to be applied the night preceding an operation, and upon returning in the morning found the whole surface red and excoriated from the effect of the strong soap.

As a substitute for the soft soap, the writer has been using an antiseptic soap paste, which is made as follows: A bar of the so-called "ivory" soap is reduced to shavings by paring it with a kitchen knife. The parings are covered with soft water and allowed to stand for twenty-four hours. At the end of this time the magma is thoroughly kneaded with the hands and forced through a sieve having about twenty meshes to the linear inch. If it is not uniformly smooth, this is repeated until the soap passes through as a soft-uniform paste. With this is incorporated by a kneading process one gramme each of boric acid and bolted corn-meal to every eight grammes of pulp.

The addition of the corn-meal furnishes sufficient grit to thoroughly remove all particles of dirt.

REPORT OF A CASE OF INTRACRANIAL TRIFACIAL NEURECTOMY.¹

By SAMUEL S. THORN, M.D.,

OF TOLEDO, OHIO.

MRS. S., German, aged sixty-four, mother of ten children, came to me in September, 1893, suffering from severe, intractable, trigeminal neuralgia, right side; the full limits of the three divisions were involved. The disease had four years' duration. At first intermittent, and most severe in the second division. After a year the paroxysms lengthened so as to become almost continuous. Her general health had become very much impaired by reason of loss of sleep and failure of nutrition. Under treatment she improved and the local symptoms became markedly less severe. Notwithstanding her improvement, I advised intracranial neurectomy with an effort to remove the Gasserian ganglion. This was declined, and in the fall she returned to her home at Put in Bay. In July, 1894, she again came, and this time asked for the operation. The winter's experience, shut in from the outer world, made her willing to undergo any operation that offered relief. She was ready to take all chances, submit to anything, preferring death to the life she had lived during the past winter. Accordingly on August 11, 1894, her general health having again much improved under treatment, I performed the operation. Following the plan devised by Dr. Frank Hartley, of New York City, I made an omega-shaped incision, beginning at the external angular process of the frontal bone, right side, and extending at the crown of the arch to three and a half inches above the zygoma, and thence down to or in front of the tragus of the ear. The base corresponding with the line of the zygoma was not divided. The incision in its whole length was carried down to the bone. This was next divided along the line as above described by a chisel, known among carvers as a parting tool. The cutting edge was V-shaped, and the same as used by Dr. Hartley. The vitreous plate was in the main divided by

¹ Read before the Toledo Medical Society.

a smaller blade of same shape. Along the crown of the arch it was cut through and the carf opened wide enough to admit a heavy, plain-faced bone-chisel, which, used as a lever, pried the circular piece of bone off from the dura, fracturing it at the base. This, though a forcible effort, was done with considerable care to save intact, if possible, the middle meningeal artery, which we so often find embedded in the bone, in some instances tunnelling it. Care is necessary here, because by rougher effort a rupture may be made, which, of course, adds to the embarrassments of the operator. In this case the vessel, well defined, was not ruptured. The separated bone with the integument muscle covering was turned outward and down upon the cheek. I carefully raised the dura and brain from the middle fossa of the skull. Here I met with a condition for which I was unprepared. During a large experience in skull- and brain-work I had uniformly found the dura possessed of some considerable strength of tissue, but here it was thin and soft. In the effort at elevation it was several times perforated by my finger. Aside from this there were few or no hinderances. A light escape of blood, which was easily controlled by gauze pressure. The division and removal of the nerves accomplished, the brain was allowed to settle into the fossa. The bone with its soft covering was restored to place, sutured, and the patient returned to her bed. The main difficulty attending the operation was the loss of blood, which was very great, from the incision and external covering of the skull, the greatest I had ever met with in operations upon the head. Added to this were those attending the use of the anæsthetic. Dr. Chapman, to whom was assigned this important work, notified me several times to be as expeditious as was compatible with the operation, as the patient was doing badly. The ganglion was not entirely removed for reasons readily understood by those doing such work. Time required, one hour and forty-three minutes from beginning to finish. I am greatly indebted to Drs. Collamore, Duncan, Chapman, and Becker for valuable assistance. Dr. Hasenkamp was also present.

August 12. Patient has rested well; no pain. Dressings being soiled by oozing were renewed under proper precautions.

August 13. Patient's temperature, $101\frac{1}{2}^{\circ}$ F.; no pain.

August 15. Aside from some functional derangements, hallucinations, everything was very promising. No temperature; no pain.

August 16. The hallucinations still continuing without pain, sleeplessness, or temperature, I suspected the condition might depend upon iodoform absorption.

August 18. Dressing changed, all iodoform removed, and boracic dressings substituted.

August 19. No temperature; no pain; sleep good. Hallucinations less marked. Ordered iron and quinine.

August 20. Condition improving. Hallucinations subsiding.

August 23. Hallucinations absent. Dressings removed. Wound practically closed. No pus thus far.

August 26. Patient discharged cured.

Operation was made at St. Vincent's Hospital general operating room.

September 12. Patient seen this day. Cure is complete. She is entirely free of pain. Nothing now remains except slight ptosis, which has continued since time of operation, though now almost recovered from. This, I believe, is the first time this operation has been performed in this State, Ohio.

December 15. Reports from patient show no return of pain. Ptosis practically recovered from.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, December 12, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

CHRONIC DISLOCATION OF SHOULDER WITH FRAC- TURE REDUCED BY HOOKS.

DR. CHARLES MCBURNEY presented a man who had come under his care, October 25, with subcoracoid dislocation of the right humerus, existing seven weeks. All the signs of dislocation were very well defined. The man was first seen in the out-patient department of Roosevelt, and was sent to the inner department after unsuccessful attempts at reduction under ether. Dr. McBurney then tried reduction under ether and without instruments, but the immobility was excessive, and he was unable to essentially alter the position of the head of the humerus, and rotation could be made to a very limited degree only. The extreme difficulty seemed to be due, as shown later, to fracture of the outer tuberosity and the production of new bone, which struck on the edge of the glenoid cavity with every attempt at rotation. Having made a thorough trial of various methods, he finally used the hooks which he had some months ago shown to the society for reduction of dislocation when reading a paper upon dislocation of the humerus complicated by fracture of the shaft near the head of the bone. In this case the method again succeeded. A small incision was made down to the outer aspect of the shaft about two inches below the head, a hole was bored, the hook was introduced, but sufficient counter-extension on the scapula could not be made with hands or otherwise. Consequently a second hole was drilled, entering the spine of the scapula just at the base of the acromion.

The object of the second hook was to hold the scapula rigid, which it did perfectly. Even then he was unable to effect reduction

with the use of a great deal of force, until the capsule had been freed with the knife and periosteal elevator. Reduction was then complete and easily maintained. The operation having been done on October 25, healing was complete by November 15, since which time passive motion had been made daily. The patient had since been placed under ether once for the purpose of stretching some of the parts. Gradually considerable motion had been obtained, and there was no doubt but that the arm would become very useful.

The cause of limitation of movement was shortening of the ligaments and muscular tissue during the period of inactivity in malposition, and these tissues under the improved conditions would again relax and lengthen. There was no other obstacle to motion, for the joint surfaces were perfectly smooth and unimpaired.

The extent to which fracture had existed could not have been determined except by making undue separation of the soft parts. The diagnosis of fracture was based on the recognition of undue bony prominence, which could be accounted for only in that way.

DR. ARPAD G. GERSTER said he had twice had occasion to make open section of the shoulder-joint for old unreduced dislocation, and, as to the outlook for ultimate mobility, he thought one could safely predict that it was very good. It would be good, even if the patient should neglect to make intentional motion. In the first of his cases the man's occupation led him more or less to the use of alcohol, and for this reason he had neglected to have his shoulder reduced for thirteen weeks. When later reduction was effected with the use of the knife, the patient was urged to keep up motion in order to develop the joint, but he neglected it, and when seen a year and a half later the motion was no greater than in the case shown by Dr. McBurney. Four years later Dr. Gerster met him again accidentally, and, as he was somewhat under the influence of liquor, he took pride in showing on the street what marked control he had regained over his limb. Dr. Gerster was himself much surprised at the marked improvement which had taken place.

The second case was that of a young man who was very docile, and carried out all instructions, even to the application of large cataplasms over the joint for the purpose of hastening absorption of cicatricial deposits, after the method of the so-called bone-setters. In addition, massage and active movements, not passive movements, were employed. Dr. Gerster said he thought passive movements, if resisted by the patient, did harm by causing small hæmorrhages and

finally deposit of cicatricial material, besides demoralizing the patient and robbing the surgeon of his intelligent aid which was necessary to rapid success.

Dr. Gerster said, in conclusion, that he believed, in all cases in which the cartilaginous surfaces had not been destroyed and bone deposited, the ultimate result would prove very good indeed. In both his cases there had been band-like adhesions and deposits of tissue which made necessary extensive bloody dissection preceding replacement.

PLASTIC OPERATION FOR PROMINENT EARS.

Dr. McBurney presented a boy who had been born with complete fissure of hard and soft palate, and with unsightly projection of the ears. He had come of healthy stock. Dr. McBurney had repaired the cleft palate, and in order to improve the lad's appearance had done a plastic operation upon the ears, one which he had often performed in similar cases. The operation was first suggested by Dr. Ely, an artist of this city, who died some years ago. Out of a number of methods tried in different cases by the speaker, this one had proved most satisfactory. He took out a very large piece of integument over the mastoid process, also a large fold off the back of the ear, and a cartilaginous section from the ear, a quarter of an inch in width at the middle and tapering to points, and not involving the inner integument. The cartilaginous defect was closed by deep catgut sutures, the edges of the skin wounds on the back of the ear and over the mastoid process and temporal bone were then accurately stitched together. This procedure at once placed the ears nearly flat against the side of the head. The whole head was then securely bandaged so that no displacement could occur during the healing. Unless cartilage were removed, the improved appearance would last only a few weeks. He thought there were a good many people who would be more presentable if they were to submit to this operation. The one suggested by Dr. Keen had not impressed the speaker as likely to prove satisfactory as the section of cartilage removed in that operation was so very small.

AMPUTATION OF THE ARM FOR CANCER IN A MAN AGED TWENTY-NINE.

Dr. R. H. M. DAWBARN presented a man who, although only twenty-nine years of age, had had cancer of the arm for which he

had recently performed amputation at the shoulder. Some years ago he had been so badly burned as to render the right upper extremity practically useless. On the scar over the upper arm an ulcer formed and spread rapidly in spite of all possible care. Four months ago microscopical examination, made at the Polyclinic, showed that the rebellious sore was beyond doubt cancer. Eight weeks ago Dr. Dabarn amputated at the shoulder and removed all axillary fat and lymph-nodes. Several of the latter were enlarged, and microscopic examination subsequently proved them to be cancerous.

An interesting point in the operation was control of hæmorrhage by Wyeth's mattress-needle and a constricting rubber band, one pin instead of two being used. The pin was introduced at the tip of the coracoid process, carried through the capsule of the shoulder-joint, grazing the head of the humerus, and escaping at the rear border near the axillary edge of the scapula. A soft rubber tube was thrown around above the mattress-needle, and made to constrict the underlying tissues and vessels so that hæmorrhage was absolutely controlled. Healing subsequently was entirely satisfactory.

Before the operation the man's condition was very miserable. He was white from anæmia, the pulse was scarcely to be recognized, numbering between 150 and 160, and it seemed very doubtful whether he would survive the operation. In order to prevent shock, Dr. Dabarn resorted to a method which he had practised in major surgical cases for two or three years and with which he had been very much pleased. This was intravenous, hot, saline infusion.

While the patient was still on the operating table, after the amputation was completed, he injected into the median basilic vein nearly two quarts of six-tenths of 1-per-cent. salt solution, as hot as the hand could bear.

The result was remarkable. The patient was removed to bed in better condition than before the operation. The pulse had steadily gone down in frequency and increased in force.

He thought the effect of the injection in preventing shock through the stimulus of the heat was a double one; partly by action upon the muscular tunic of the blood-vessels (and perhaps their sympathetic nerve-centres), causing them to contract, instead of dilating from shock with resultant serious anæmia of brain and heart; and partly by action upon the heart, which contracted more vigorously both because of the bulk of fluid distending its chambers and of the heat.

DR. JOHN A. WYETH said he had used this method for preven-

tion of hæmorrhage in amputation at the shoulder in two cases before he had employed it in hip-joint amputation. It had worked beautifully, controlling hæmorrhage perfectly.

DR. MCBURNEY thought one might fairly question the correctness of Dr. Dawbarn's theory regarding the *cause* of the benefit derived from the hot saline injection. For his own part, he had great doubt whether it was due to the heat, believing that the temperature was unimportant, provided it was not below that of the body. It was rather the quantity of the fluid injected into the vessels which produced such striking benefit. He had used the method a great deal, and the different ways in which various nurses and attendants had handed him the solution would account for its having been injected at different degrees of temperature, yet the benefit appeared to be about the same for the same quantity. If the temperature were left for him to arrange, he thought he would prefer it always at a high degree, but occasionally it had been handed him lower than he should like, yet full benefit had been obtained. He regarded it as the most valuable resource in modern surgery to overcome the condition induced by loss of blood and shock.

DR. ABBE called attention to the statement by Chiene in the report of the Edinburgh Hospital, last year, that Spence had used the bloodless method in the hospital years ago in hip-joint amputation, employing a single skewer and tourniquet, and stated further that it had also been used on the shoulder and scapula.

DR. DAWBARN rejoined, with regard to the effect of heat upon the heart, that he should never forget a case which he saw, when a medical student, operated upon by the late Dr. Sands, at Roosevelt Hospital. The patient seemed nearly dead, when Dr. Sands laid cloths, wrung out of scalding hot water, upon the præcordial region, which made blisters as large as one's hand, remarking to the observers that there was no means in his judgment as successful in stimulating the heart during collapse upon the operating table as heat applied over the heart; and that the effect could not be entirely due to reflex action, since the patient was under anæsthesia to the surgical degree. Dr. Dawbarn had also heard Dr. McBurney, years ago, refer to the extreme value of heat applied in that way. Now, if this be true, how much greater must be the good effect, if the heat be brought more directly and effectively to the heart, by means of hot saline infusion.

Dr. Dawbarn quite agreed with the other speakers, that the bulk of the fluid injected was the main factor in its value. The amount

commonly recommended in the books was ridiculously small. Quite recently in an article in the *Medical Record* very small injections were advocated "lest the kidneys should be drowned out."

A smaller amount than a quart would seldom be of much use; and in bad cases this should be repeated some hours later, as indicated. It was a bad rule to replace the blood lost at the operation only by an equal amount of salt water. We should not forget the *inward* bleeding from shock,—into the patient's own veins, especially the abdominal,—which fact necessitated more bulk of circulating fluid, to prevent fatal anæmia of brain and heart.

Four years ago the speaker had spent a good part of the winter in making experiments upon dogs, in the matter of bulk and temperature of saline infusion, at the physiological laboratory of Columbia College, by the courtesy of Professor Curtis; and had reported the results of his work, bearing upon this discussion, in a paper read before the Surgical Section of the New York Academy of Medicine. At that meeting he had exhibited a large number of tracings made with the kymograph—a giant sphygmograph—by aid of the mercurial manometer. These showed distinctly the great value of extreme heat in the saline infusion. The dogs could bear considerably greater losses of blood when hot infusion followed bleeding than when merely a blood-temperature fluid was used.

It was interesting to note that in one instance a fatal result was due to injecting simply warm water, devoid of salt. He supposed that Dr. Brockway, who was assisting, had added the usual heaped teaspoonful of table-salt to a quart; and Dr. Brockway supposed that Dr. Dawbarn had done this. As a matter of fact, neither had done so; and the dog died with convulsions quite promptly after receiving this plain water intravenous infusion. Professor Curtis, who was standing by, explained the death by saying that water devoid of salt quickly dissolves the hæmoglobin out of the red blood-cells; and that, save in small amounts, this action would be enough to cause death.

Dr. Dawbarn stated that he had been astonished that this fact was ignored in several recent articles upon saline infusion. For example, in the published transactions of the London Obstetrical Society (meeting of December 6, 1893; see *American Gynecological and Obstetrical Journal*, September, 1894), the paper of the evening and several of the speakers had suggested plain warm water as a good fluid for saline infusion; although none of those present had actually employed it.

As to the best temperature for the injection, Dr. Dawbarn thought it should not be cooler than 120° F., or as hot as the hand can bear. Doubtless the fluid, by dilution in the blood, is much cooler than this by the time it reaches the heart. One need not fear this degree of heat. Indeed, the statement is made in Kirke's "Physiology" that a temperature of 160° F., or nearly 40° F. hotter than the hand can bear, is necessary in order to coagulate any albuminoid ingredient of the body. Therefore, use of a thermometer, other than the hand, is needless. The speaker maintained this heat by placing the vessel containing the salt water in a larger one, which latter contains hot water. The temperature of this outer water-bath is maintained by addition of boiling water as needed. An assistant kept his sterilized fingers in the infusion-fluid continually, to see that it is hot enough.

DR. MCBURNEY remarked that he thought the use of the hand as a guide, as suggested by Dr. Dawbarn, was a good method, which would imply, however, a variable temperature, but one not below that of the blood. As soon as one spoke of degrees it complicated the process, which should be a simple one. Then a thermometer would add a new element of possible sepsis. If he were to name a temperature, he would say from 115° to 120° F., but he would prefer to use as a standard temperature that which the hand could bear comfortably.

DR. WYETH had used the saline solution in a number of cases, and with good results, especially where there had been great hæmorrhage. Although he had not used a thermometer, he supposed the fluid was at about 110° F., or about as warm as the hand could comfortably bear. By the time the fluid reached the circulation it would probably be about that of the blood in the viscera, or 107° F.

DR. GERSTER mentioned a case, that of a very anæmic young woman, operated upon at the German Hospital a year ago last summer for ulcerative and cicatricial proctitis. Preceding excision of the rectum colotomy had been made to improve the general condition, and had succeeded somewhat. Owing to the vascular and very brittle state of the tissues, extirpation of the lower part of the rectum proved very difficult and bloody, and it became necessary during the operation to transfuse. The nurse brought in the saline infusion so hot that no hand could bear it, and as he urged the assistant to make haste in cooling it, they surrounded the vessel by ice and salt in a bucket. The result was that when brought to him the fluid was not

only not hot, but decidedly cold. As the urgency was great, there was no time in which to prepare more fluid, consequently he trusted to luck and proceeded with the injection. The patient's condition improved at once, the pulse became stronger, and she survived. Therefore he shared entirely the view expressed by Dr. McBurney, that the benefit was due chiefly to the quantity of liquid injected and the increased arterial tension, although he would not deny for a moment that the temperature was also an important element. The question had also been decided by experiments upon animals, which showed that the quantity of the liquid used exerted the chief influence.

CICATRICAL STRICTURE OF THE ŒSOPHAGUS TREATED BY RETROGRADE DILATATION.

DR. GEORGE WOOLSEY read a paper on this subject. (See page 253.)

DR. JOHN A. WYETH wished to place on record a case seen by him four years ago. An Italian woman, four months pregnant, being a bottle-cleaner, swallowed some acid accidentally, and had in the course of two or three weeks complete occlusion of the œsophagus. When she came to him she could not swallow liquids. He performed immediate gastrostomy, and fed her through the opening until her child could be born at term. He failed utterly to pass a bougie from below upward, or even to find the stomach opening of the œsophagus, probably because it was closed by stricture. The woman disappeared from view for a year, and then she was swallowing whatever she cared to eat. There had been no treatment meanwhile. The case showed that by rest following gastrostomy, then beginning to swallow fluids and later solids, the œsophagus could be restored to function.

DR. GERSTER inquired of Dr. Woolsey whether his statistics included a case of impermeable stricture of the œsophagus treated successfully by the retrograde process, not published in periodical literature, but in Dr. Gerster's book.

Receiving a negative reply, he said the case occurred in 1886, in a girl who had become pregnant by lapsus, and tried to commit suicide by drinking carbolic acid. An œsophageal stricture resulted which could not be passed, and, finally, gastrostomy was resorted to to save her from starvation. Through the artificial opening attempts were made daily, for about ten days, to pass a bougie beyond the

stricture, finally with success. Then, by using a string, larger and larger instruments were introduced, until dilatation was sufficient to allow of swallowing. In this case there occurred what Dr. Willy Meyer had observed in a case of œsophagotomy wound,—namely, a tendency to infection. High fever developed, which could be accounted for only by a large subcutaneous abscess of the dorsum, supposed to be metastatic from infection through the œsophagus. She recovered, and was successfully delivered of child.

DR. ABBE thought gastrostomy and closure of the wound at one operation could usually be done. If the parts were handled carefully there would not be the slightest danger of leakage into the peritoneal cavity. The stomach, if not already empty, should be emptied as soon as opened, then stitched to the skin, and all the steps taken without infecting the peritoneum. The opening should be large enough to admit the finger, and to explore the lower end of the œsophagus. He had had three cases in adults in which he was able to readily find the stomach opening of the œsophagus after a little search, and pulling it forward could pass an instrument along-side the finger.

He emphasized the fact that it was safer to dilate the stricture from below with a bougie pulled up by a string than with one which had no guide, since the latter was liable to engage in folds of membrane pushed ahead of it, and make a false passage. He believed that most strictures could be successfully dilated in this manner, and that cutting with a string or by other methods could be thus obviated except in the more dense strictures. He remembered well when, eight or nine years ago, Dr. Sands showed his case of successful internal œsophagotomy by a dilating cutting instrument, somewhat like Otis's urethrotome, and it was considered a great triumph that the patient recovered, so great was the risk of methods of operating at that time. To be able to-day to report twenty-seven successful cases of retrograde dilatation from the stomach was a striking contrast as to safety.

DR. KAMMERER said, with regard to finding the stricture, that in the case of Dr. Gerster, Willy Meyer, and his own, he had made most conscientious efforts to pass through the stricture from the opening in the stomach. The opening was a large one, but the stricture could not be passed, yet on performing external œsophagotomy the instrument entered the stomach readily from the direction of this wound.

WANDERING DERMOID TUMOR.

DR. WYETH presented a tumor with the following history of the case: A week ago a Russian woman, thirty years of age, housewife, entered Mt. Sinai Hospital with symptoms of obstruction, and of peritonitis supposed to be due to appendicitis, the region of the vermiform appendix being the seat of greatest pain. Her symptoms dated back six days. On opening the abdomen over the appendix he found the peritoneum very thick, with evidences of old peritonitis, but no inflammation or adhesion of the appendix. On passing his finger towards the median line it came in contact with a mass adherent to the omentum half-way between the umbilicus and pubes. On detaching it it was found to be a dermoid, containing yellow hair and other material. Wandering dermoid seemed to be a rare condition. The patient recovered.

Stated Meeting, December 26, 1894.

The President, ROBERT ABBE, M.D., in the Chair.

RESULT AFTER OPERATION FOR APPENDICITIS.

DR. CHARLES MCBURNEY presented a young man to show the result after operation for removal of the appendix by the method described by him last spring. By this method the incisions do not divide any of the muscular or tendinous fibres. The skin incision is made about as it usually is in removal of the appendix, an inch or an inch and a half inside the spine of the ilium in an oblique direction, passing through skin and connective tissue only. The next incision passes through the aponeurosis of the external oblique in such a way as merely to split the fibres of the external oblique, and not divide any of them across. It is very easy to accomplish this division or separation, making a small puncture, and then using the scissors, not as a cutting instrument, but simply as a means of splitting the aponeurosis. The aponeurosis is split a distance of about four inches, the edges of the wound in the aponeurosis are pulled apart with retractors, so as to uncover the surface of the internal oblique, the fibres of which lie at nearly a right angle with the incision made in the external oblique. Then the direction of the incision is changed from the

nearly vertical to nearly transverse, and the fibres of the internal oblique and transversalis are separated from one another, but without division of any of the fibres. They are readily separated with a dull instrument and with the fingers, so as to expose the transversalis fascia. This fascia, with the peritoneum, are then divided in the line of the separation of fibres of internal oblique and transversalis muscles. The entrance is not a large one, but is sufficiently large to allow of the removal of the appendix in nearly all cases operated upon in the interval of repose between attacks, and it is for those cases only that this method of operating is specially recommended. The appendix is now reached and taken out. When the wound is closed the fascia transversalis and peritoneum are stitched with fine catgut very easily, and the fibres of the internal oblique and transversalis muscles fall together in nearly normal position, requiring only a few catgut sutures to make the apposition more perfect, for, owing to the forced separation, the muscular masses show a tendency to fold upward and be loose. The external oblique is stitched from one end of the opening to the other. The skin wound is closed, the subcutaneous space being drained by a small bit of rubber tissue only.

At the time he reported this operation he had employed it upon four or five patients, and since then he had operated upon fourteen or fifteen more, and with most satisfactory good results. All the wounds with one exception have been closed completely without drainage, except that in the skin wound a bit of thin rubber tissue is placed. The healing has usually been very rapid. The patients are so well by the end of from fourteen to eighteen days that he now allows them to get up much earlier than formerly, and, as far as he could see, without disadvantage.

Although the operation may be a little more difficult than the old one, where a large free incision is made through the muscular tissue, yet it has certain advantages. In the first place, the absence of division of the muscular fibre of the transversalis is a very great advantage, and, in his opinion, allows a quite perfect restoration of the strength of the abdominal wall. The absence of hæmorrhage is also very noticeable. If care is taken, there is no necessity for having any bleeding points, except, possibly, one in the outer angle of the muscular separation of the deeper muscles, and that can be easily avoided. There is an arterial branch at that point which can be readily recognized when the separation is made. Aside from that, the operation is accompanied by no hæmorrhage except from the skin section.

Another advantage is that there is no injury to the nerve-supply of the abdominal wall. The separation of the muscular fibres and the incision do not involve any nerve-fibres at all except those that are conveyed through the skin and subcutaneous connective tissue. The nerve-supply of the internal oblique and transversalis, and the nerve-trunks that run to the rectus muscle, are not touched by any step of the operation. This must have a bearing of some importance on the subsequent strength and symmetrical resistance of the muscular fibres of the two sides of the abdominal wall. If section at right angles to the direction of the muscular fibres of the internal oblique and transversalis is made, very considerable damage is done to important nerves, causing actual paralysis of a considerable portion of the deeper muscles and of the lower portion of the rectus muscle. He had often seen after such incisions, although the wound healed well, relaxation of the abdominal wall on that side as compared with the other. He presumed that such general relaxation is due to the division of the nerve-fibres supplying the muscles.

The patient presented illustrated the result of the new method of operating. The two sides of the abdomen were perfectly symmetrical. There was no weakening or bulging of any part of the abdominal wall. The cicatrix lay in the skin and in the skin only. The scar slid freely over the deeper parts, showing that it was only in the skin. None of the patients operated upon in this manner had worn a bandage or strap of any kind after the operation.

DR. JOSEPH D. BRYANT said he had operated in one case in the manner described by Dr. McBurney, except that the incision through the transversalis fascia was in the direction of the separated fibres of the transversalis muscle. The patient made a good recovery.

DR. L. A. STIMSON wished to add his testimony to the value of the operation. He had employed it, not only during the interval between attacks, but also in some suppurative cases during the attack, and found it not only practicable in some such, but also very useful in reducing the extent of that part of the cicatrix which also extends entirely through the walls. Further, he had employed it in two or three cases of exploration of the abdomen, and had had the satisfaction of knowing that the patients recovered from the operation, not only with their lives, but also apparently with the abdominal walls none the worse for the operation. In two cases he had also employed it in inguinal colotomy, with a view to getting sphincteric action of the muscle upon the protruding end of the intestine. He regarded

the method as a most valuable addition to the surgeon's resources, and thought that Dr. McBurney was too modest in restricting it entirely to non-suppurative cases.

DR. GERSTER wished to put on record two cases of appendicitis in which he had employed the new method. The results had been very good indeed, and it was in accord with reason that they should be, for the operation was logical and well conceived. However, he did not think the operation could be very generally employed, especially where time was of moment. He thought we would, in most cases, still have to adhere to rapid methods of opening the abdomen and to take the chances, which were not great, of subsequent hernia.

DR. WYETH asked Dr. McBurney whether he could stretch and separate the fibres of the transversalis muscle to advantage in his operation. He had never tried it himself, but should suppose it would be difficult on account of their shortness at this plane. Although he had always divided the transversalis and internal oblique, he had always been accustomed simply to separate the fibres of the external oblique.

DR. MCBURNEY replied that he had never found any difficulty in separating the fibres of the transversalis and internal oblique, but the procedure was easier the nearer one approached the anterior spine of the ilium. The nearer the rectus muscle the greater the difficulty.

DR. WYETH had no doubt of the great value of the incision, but agreed with Dr. Gerster that there must be many cases in which it would not be advisable to adopt it. It would be of interest to know in what proportion of cases of appendicitis it could be employed, and in what proportion the old incision would have to continue to be made. Since this question had suggested itself to him, the past twelve days he had inquired among his private patients as to the result of old methods of operating, and had obtained answers from nineteen patients operated upon since 1890. In but one had hernia resulted, and in that particular case the patient had declined to carry out the after-treatment, his physician had, without his approval, removed one of the sutures and gone home at the end of three weeks. He was told that he would probably have hernia and that he must relieve Dr. Wyeth of all responsibility for it. Dr. Wyeth was of opinion, then, that the old method of incision, with care to include carefully the several layers in one row of strong silken sutures, gave very good results.

DR. ABBE had employed the method in four cases since it was

first described by Dr. McBurney, and with perfect satisfaction. He had also found it of decided advantage to hold back the skin and external oblique by suture attached to a distant point of the skin, thus avoiding the necessity for using more than a single retractor in order to gain access to the deeper parts. He had understood Dr. McBurney to suggest this in his paper.

DR. MCBURNEY reminded Dr. Gerster and Dr. Wyeth that the class of cases in which he had recommended the operation was that of recurrent appendicitis, the operation to be done during the period of quiescence. There was, therefore, plenty of time for its performance. He had not recommended it in suppurative cases; on the contrary, he advised against its application when pus was present. Regarding uniting edges of muscle cut crosswise, he said it was impossible, no matter how painstaking the operator might be, to bring them together perfectly evenly so that the cut ends of each fibre should be in exact apposition. To accomplish this absolutely, it would be necessary to unite the ends of each divided fibre by separate suture, which was impossible. Where the body of a muscle was divided, all one could do was to insert several sutures and bring the ends together *en masse*. The ends of the individual divided fibres might be near one another, but most of them would, of course, not be in apposition.

TRANSVERSE FRACTURE OF THE PATELLA WITHOUT SEPARATION.

DR. MCBURNEY presented a man who had sustained an unusual form of fracture of the patella, the case being of some interest in connection with the etiology of patella fractures. The patient fell, five weeks before, striking his knee upon the sidewalk, and as he seemed to be unable to walk he was brought to the hospital. On examination it was found he had a transverse fracture of the anterior surface of the patella, but without mobility of any kind between the upper and lower ends of that bone. Dr. McBurney examined him personally the day after the injury. The fracture extended in a transverse direction, and involved the anterior surface only, a groove marking the line of injury from one side to the other. The same condition still exists to-day as at the time of the accident. Of course, recovery was rapid, the treatment being simply for a mild amount of contusion of the soft parts. A furrow of quite appreciable depth can be recognized running from one edge of the bone quite to the other.

No amount of manipulation, even the first day after the injury, caused any change of relation between the two ends of the patella.

Fracture of the patella seldom takes place from direct violence, and when it does so occur the fracture is usually comminuted. A great many of the patients state that the accident occurred from falling upon the knee, but usually they are in error. The fracture takes place from muscular action before the fall, and the latter is the result rather than the causative factor. This case is an exception, the patient having fallen upon the knee, thus causing a transverse fracture of the patella, but not in the ordinary sense.

DR. GERSTER remarked that it was a great pity Dr. McBurney did not see the man before he broke his patella, because then we would be much better able to settle the question whether the patella was broken or not. He could not conceive how a patella can be broken and not be broken completely through, nor how the periosteum could be strong enough to hold the fragments together so firmly that it would be impossible to move one upon the other. He had then a patient in Mt. Sinai Hospital who came in just after an injury. The diagnosis of fracture of the patella was easily made by the mobility of the two fragments. The patient, however, was, and is yet, fully able to lift up the limb by volition; there was no functional disability, and no gap. He was sure that when the case shall have healed nobody would believe the patella had been fractured.

DR. MCBURNEY did not think it difficult to explain this at all. Suppose he held a patella in his hand, well supported on its under surface. If a sharp blow be struck on its anterior surface with a proper instrument, a fracture of the anterior surface can be produced without injuring the posterior wall. The question depends upon the manner in which the patella is supported. The patella breaks when supported in the middle and when sufficient tension is applied at the ends; it would seem that in this case it happened to be supported in the right way, by a considerable surface underneath, and the anterior surface alone broke.

Such he believed to be the explanation of this case, nor did he think it an unreasonable one at all. As to the possibility of it having been a complete fracture, to put it mildly, it is absurd. He saw the patient the day after the injury and the same condition existed as five weeks later. There was a gap in the anterior wall, but no mobility of the patella ends upon one another; the man had complete power of flexion and extension, conditions quite inconsistent with separation of the fragments. The skin was not broken.

DR. BRYANT suggested that, since the notch extended from one side of the patella to the other, it would be necessary to assume that the sharp surface on which the man fell was semilunar in outline?

DR. L. A. STIMSON said he felt a distinct groove along the site of the injury, extending across the patella, and he thought there must have been a complete fracture, produced probably by traction through the ligamentum patellæ acting at an angle to the long axis of the patella while the knee was flexed. He could not understand how a sharp instrument could have produced a depression in the bone without wounding the soft parts. While one might be able to break into the surface of the patella by striking it with a sharp instrument as it lay on the hand, he doubted whether he could do it on the knee without cutting the skin. He was disposed to think there had been complete fracture, but that the two fragments had been held in such firm and close proximity by the tendinous prolongations along the side of the patella as to prevent recognizable mobility. He reminded the society how often opposing opinions had been held by its members as to the presence or absence of mobility in cases exhibited.

DR. GERSTER thought the absurdity lay in basing a diagnosis on insufficient data; that as long as mobility of the fragments had not been proven, and there had been no displacement, it could not be asserted that fracture had occurred.

DR. MCBURNEY did not accept the points made by Dr. Stimson at all, because there was no difficulty in making such an examination. There was no more difficulty than in examining a case of fracture of the tibia. In a case of injury to the tibia he knew, after careful examination, whether the bone was broken or was not broken, and it is useless to talk about tendinous or muscular fibres holding the parts together so that fracture cannot be recognized. When an examination of a long bone is made in the proper manner, with increasing force, one can determine positively whether it is fractured or not. If a short bone, as the patella is being examined, and the forces are applied in the right place, making tilting motion, one can ascertain accurately whether two separate fragments exist or not; no fibrous tissue could resist such force as could be applied, so that, if complete fracture were present, one could not detect motion. One examination of that kind is worth all theories that can be raised. Was there ever a case of complete fracture of the patella in which, at the end of five weeks, only such perfect flexion and extension existed as is seen in this patient?

DR. STIMSON rejoined that, of course, one examination as to mobility would be final if our senses were not imperfect. He had seen cases presented at this society in which mobility was tested in different ways, and he had seen the society divided in two camps, one of which was necessarily wrong in supposing that there was or was not mobility.

INTESTINAL OBSTRUCTION AFTER OPERATION FOR APPENDICITIS.

DR. MCBURNEY presented a woman, aged forty-six, on whom he had operated for large abscess originating in acute suppurative appendicitis, in June, 1893. No attempt was made to find the appendix. The wound was packed and healed entirely. Eighteen months afterwards she began to suffer from pain in the abdomen, which continued with intermissions and increasing constipation for four months. Three weeks before the last operation she began to have a good deal of pain in the neighborhood of the cicatrix, which had become prominent. When she again entered the hospital it was as a case of intestinal obstruction, with a history of fecal vomiting for a week, a painful tumor over the region of the whole cicatrix, absolute constipation, temperature of 100° F., pulse 106, and very bad general condition. Dr. McBurney found a tumor, nearly as large as a lemon, at the site of the old cicatrix, which was quite tender and had the general feel of a more or less strangulated and positively irreducible hernia. He made an incision nearly in line with the old cicatrix, and soon found that the tumor contained intestine, markedly constricted, nearly black. It took some time to make out the exact anatomy, but after uncovering considerable intestine it became evident that the wall which had hemmed in the peritoneal cavity from the abscess cavity had gradually approached the surface and become everted, bulging out just as peritoneum might protrude in a hernia. At one point a distinct ring had formed in the irregularly-everted mass. Cicatricial tissue had gone before it, intestine had followed, so that an artificial hernial pouch had formed, and the intestinal contents had gradually become constricted.

By cutting away the constricting ring and a number of old adhesions in the neighborhood the strangulation was relieved and the intestine returned. Good healing took place. Dr. McBurney said it was one of a number of cases which illustrated the undesirability of allowing large appendicitis abscesses to form at all.

TRAUMATIC EPILEPSY; TREPHINING; HETEROPLASTY
WITH CELLULOID.

DR. WILLY MEYER presented a man, thirty-five years old, who, in Texas, in 1888, had been struck on the upper part of the left parietal bone by a large piece of wood. He was unconscious for a minute, but afterwards felt well and attended to his work for three days. He then suddenly had a convulsion without loss of consciousness. The entire body trembled, and he afterwards felt very weak. The following day he had a similar attack, and more severe ones within the following four weeks. He therefore went to town and was trephined, evidently with a small trephine, since the bone shown him measured only half an inch in diameter. The doctors told the patient a small blood-clot was removed, but no spicula of bone was found. He was afterwards perfectly well and attended to all kinds of work until June of the present year, a period of over six years. In June, while sitting and talking with a friend, he suddenly jumped up, acted wildly, struck his head against a wall, was held by friends, then became unconscious, and had convulsions for half an hour. Convulsions recurred after that with increasing frequency, and the man was advised by Dr. Jacobi to enter the German Hospital, where he was seen by Dr. Meyer. His look was peculiar, and he was unable to see well with the left eye. He also did not hear as well in the left ear. Under the quiet of the hospital no convulsions occurred. The scar at the seat of the old trephine was very painful to the touch. Dr. Meyer operated on August 9. After reflecting one large flap convex anteriorly, the original trephine opening was found very small. The dura was at once exposed, it being closely adherent to the sharp edge of the bone and bulging out of the hole in the skull. In pushing it very gently down from the edges of the bone it tore at one point, and the brain protruded. With the rongeur forceps a large piece of bone was now removed, freely exposing this portion of the brain. The organ continued to protrude slightly. The dura could not be closed. As it was not practicable to close the gap with a skin-bone flap, Dr. Meyer decided to do heteroplasty with celluloid, after the manner proposed a number of years ago by Fränkel, of Vienna. The only plate obtainable in the city at that time was much thinner than ought to be used. The one used measured three by three and a half inches. It was put directly upon the bone, and was then covered by the periosteum and other tissues of the scalp. Periosteum and skin were

separately stitched with catgut up to the two ends of the incision. Here a small-sized drainage-tube was carried out in order to give exit to the blood which slightly oozed from the exposed brain. To enable proper drainage two narrow slits had been cut into the plate. Through these the tubes passed underneath the plate. The wound healed by primary union. The drainage-tubes were removed on the eighth day at the first change of dressing, and the patient discharged on the fourteenth day after the operation with the wound firmly closed.

At first, after the operation, the pulsation of the brain was transmitted through the plate. Six weeks after healing had taken place it felt perfectly firm and free from pulsation.

The speaker hoped that the operation might in this case have a real curative effect, as the brain, which had been formerly caught in the narrow hole, was now entirely relieved from pressure.

DR. MEYER mentioned a second case of trephining of the skull for a compound fracture in a boy, in which he used a round celluloid plate without employing drainage. The wound, which could not be closed entirely, had healed well by granulation. He thought heteroplasty with celluloid had a bright future, for the rather cheap material could easily be shaped with the scissors and rendered aseptic by boiling.

DR. GERSTER wished to put on record a case presented about a year ago to the Neurological Society, in which he had employed heteroplasty, using, according to Dr. Beach, of Boston, gold plate like that employed by dentists. The first operation had been done for cyst of one hemisphere. Afterwards the patient had epileptic attacks of a local character, and, thinking they might be due to adhesion of the brain to the cicatrix, the wound was reopened, the cicatrix excised, and a gold plate introduced. There was relief for four or five months, but at present the patient was again having attacks.

DR. B. F. CURTIS said that in operating on a case of tubercular tumor of the brain he had placed over the opening in the bone a thin plate of aluminum. Unfortunately recurrence of tubercular inflammation had caused breaking down of the wound, and made it necessary to remove the plate, but he could recommend that metal very highly for this purpose. It was soft and easily malleable. If too thick it could be hammered thinner, and could be cut of proper shape with the scissors. The only precaution to be observed was not to boil it in soda solution, as it was acted upon by alkalies. Possibly

that would be an advantage in using aluminium in some parts of the body, since it was not unlikely that in the course of years it would disappear under the influence of the alkalinity of the serum. The metal was easily obtained, was light, easily worked, and less expensive than gold.

EXOPHTHALMIC GOITRE; EXCISION OF RIGHT THYROID; MARKED IMPROVEMENT.

DR. ARPAD G. GERSTER presented a Russian woman, twenty-four years old, who was delivered of a child eighteen months before. During pregnancy the development of a goitrous swelling was observed, which became very much more pronounced after delivery, when exophthalmos, especially prominent on the right side, was also added to the usual symptoms. A continuous great frequency of the pulse, distressing dyspnoea on slightest exertion, and a steady enlargement finally compelled her to seek relief. Various forms of internal medication proved unavailing, and finally operative treatment was proposed and accepted. On admission, the patient presented a most typical case of the malady. The entire thyroid gland was much enlarged and pulsating, but the right lobe was fully twice as large as the left. Exophthalmos of the right eye, extreme; of the left eye, well developed but not excessive. Pulse varied in accordance with rest or exertion between 122 and 146 beats per minute. After exertion dyspnoea and light cyanosis were apparent. Swallowing unimpeded. Other organs normal. December 3, 1894, under pleasant chloroform anæsthesia, the right lobe of the thyroid gland was removed through a Y-shaped incision, as suggested by Kocher. The superior and inferior thyroid arteries were easily exposed and tied before they were severed, likewise all fibrous connections between the glandular capsule and the surrounding tissues were doubly tied before cutting, hence hæmorrhage was very scanty, and though the operation had lasted an hour and fifteen minutes, the patient left the table in an excellent condition.

The operation was much easier than in cases of old goitre where marked changes had taken place in the vessels and surrounding tissues, with adhesions and deposit of calcareous matter, etc. The gland was very vascular, but the vessels were newly enlarged and tolerated surgical handling very well indeed. The intense dyspnoea from which the patient had suffered on slight exertion was to be

accounted for by a secondary lobe of the right thyroid, which was easily turned out from between the vertebral column and oesophagus, and had caused compression of the trachea, especially when anything occurred to increase its vascularity, as, for instance, exertion. There was a well-defined fibrous septum between the right and left lobes, and they were easily separated by blunt dissection. For the sake of experiment he decided to leave the left lobe. Should it become necessary to remove this also, no fear of thyroid cachexia need be entertained, as there is a small detached thyroid lobe extending from the isthmus downward behind the sternum. Thus far, however, the improvement was so marked that no thought of operating again can be entertained. The day after the operation the pulse became somewhat less frequent, and the table of pulses noted down is as follows:

December 5, pulse 106-136.

December 6, pulse 102-116.

December 8, pulse 84-96.

December 9, pulse 78-92.

At this date a diminution of the exophthalmos was noted on both sides. The healing of the wound was by primary adhesion and uneventful, and the progress of the devolvment of the exophthalmos and irritability of the circulation remained steady. On December 22 the patient was discharged with a healed wound, excepting a minute granulating patch at the lower angle where a drainage-tube had been placed.

Altogether, the improvement is very gratifying and prompt, and it is to be wished only that it may also be a lasting one. As the trachea is bared of all soft tegumentary material except the skin, the disfigurement following the operation is considerable, but the patient is well content with the result accomplished.

DR. CURTIS had operated three times for Basedow's disease by removal of one-half of the thyroid. In two of the cases the thyroid was very much enlarged. He had recently seen the first case, over a year after the operation, and the improvement had remained. The eyes were still prominent, but not so prominent as they had been. The pulse had quieted down from 120 to from 80 to 100 without medication. Hysterical and nervous symptoms and insomnia had disappeared. The second case was operated upon last October, and had shown decided improvement, the pulse having quieted and medicine being dispensed with. The patient has gained eighteen pounds in weight.

The third case, which was also operated upon in October, had had an unfortunate and peculiar termination. The patient had a very rapid pulse, was very nervous, but showed no signs of any disease but the goitre. The urine contained no albumen. She reacted fairly well a few hours after the operation, but in less than twenty-four hours the temperature shot up to 103-4° F., the mental condition became very cloudy, the urine was found loaded with albumen. There were absolutely no signs of sepsis in the wound. She died in forty-eight hours. The rise in temperature and other symptoms could only be ascribed to thyroid poisoning, the symptoms resembling very closely those produced by overdoses of thyroid gland used for myxœdema. Dr. Starr, who had seen the patient, agreed with that opinion. But if the symptoms were due to this cause, why should thyroid poisoning have occurred in this case and not in others? Why should not the greater laceration of the thyroid in removal of thyroid cysts be more likely to cause thyroid absorption and poisoning? While he was unable to answer these questions, he thought the case ought to go on record as pointing to a possible danger of thyroidectomy in these cases. There had not been much hæmorrhage in his cases, and the operation had been easier than ordinary extirpation of the thyroid.

TRIGEMINAL NEURALGIA; EXCISION OF INFRA-ORBITAL
NERVE BY LOSSEN'S MODIFICATION OF
LUECKE'S METHOD.

DR. GERSTER presented a woman, thirty-two years old, who had had five children, and had contracted neuralgia of the infra-orbital and mandibular branches of the trigeminal during the first month of her pregnancy, three years before; the speaker discussed the merits of Lossen's method, performed on this patient. Lossen enters the spheno-maxillary fossa from the side of the head after a temporary resection of the zygomatic arch, which is turned *down* in a flap, containing the bone and its masseteric attachments. Interference with the patient's ability to open the jaws is not as great in this as in Luecke's method, where the attachments of the masseter to the zygoma are divided. After exposing the fat which fills the spheno-maxillary space, the operator should follow the posterior surface of the superior maxillary bone until the inferior orbital fissure is exposed. Acini of fat protruding from the sides of the blunt retractor, used to expose the fissure, should be picked away with thumb forceps. The internal

maxillary artery running from below upward and inward will be soon encountered and should be either drawn aside or doubly tied and divided. Behind the artery, but running horizontally from inward somewhat outwardly is the section of the infra-orbital nerve, connecting the round foramen with the external orbital fissure. In the present case, this segment of the nerve alone was excised first, then about one and a half inches of the inframaxillary branch of the trigeminal were also excised from the canal, beginning at the lingula. The operation brought immediate and complete relief. The patient was operated on December 10, 1894, and was discharged cured December 23 with complete anæsthesia corresponding to the nerve-branches that had been excised. The scar is linear and very inconspicuous, but the patient is complaining of not being able to open her mouth to the normal extent. This, however, is improving.

The second case treated according to Lossen's plan concerned a man, sixty-two years old, who was suffering some six months from a most intense tic douloureux of the infra-orbital nerve. Here, as in the previous case, all teeth had been removed from the patient's mouth without avail, and all the usual forms of topical and internal medication were found to be useless. On December 5, at Mt. Sinai Hospital, chloroform being administered, Lossen's operation was performed. To make the removal of the nerve as complete as in Carnochan's operation, its anterior terminations were exposed by raising skin and periosteum from the anterior surface of the superior maxillary bone (to do this Lossen's incision was found sufficient), then the nerve was divided in front of the infra-orbital foramen. After having exposed the trunk of the nerve in the spheno-maxillary fossa, it was secured with a silk ligature, and, being grasped just in front of the foramen rotundum with a stout artery forceps, was, as it were, evulsed from the cranium. Then the whole length of the nerve still contained in the infra-orbital canal was likewise evulsed by twisting around the artery forceps. To facilitate this last step, the orbit could be invaded from the lateral wound, the infra-orbital canal itself opened by chisel and mallet, and thus the nerve removed in one mass. In this, as in the previous case, the wound was united by suture without drainage, and healed by first intention. Relief from neuralgia and complete corresponding anæsthesia ensued. The patient was discharged cured on December 23, 1894.

DR. ABBE said that, according to his experience, Carnochan's operation was preferable to any of the later ones for tic douloureux.

All of the latter done or witnessed by him had left disagreeable restriction of jaw-action or caused greater scarring of the face. By the Carnochan operation he had in four cases removed the entire nerve, and part of it in two others, but was unable in one of the latter to get back to the posterior wall on account of old fracture exostosis.

MELANO-SARCOMA.

DR. ABBE presented photographs and microscopical sections from a case of superficial melanotic sarcoma on the skin of the breast in a woman of twenty. The growth had started on a congenital mole, the size of a pin-head, the year before, increasing rapidly until it had a thickness of one-quarter of an inch in the middle, but at the sides being entirely superficial so that the microscopic appearances were those of an epithelioma rather than of a sarcoma, he believed that some pathologists now claim that all such cases are sarcoma, not epithelioma. The question, however, was still an open one, hence the report upon this specimen, presented by Dr. E. K. Dunham, would prove interesting.

Two other prominent pathologists reported on parts of this very tumor that it was an undoubted epithelioma, but Dr. Dunham's report elucidates this.

"I have examined several sections from this specimen made in the usual way after embedding in celloidin without being able to convince myself as to the exact nature of the growth. I finally concluded to make thinner sections after impregnating with paraffin. These have been much more satisfactory, and I have arrived at the conclusion that the specimen is not an epithelioma, but a melano-sarcoma. The sarcomatous growth is in very close relation to the epithelium of the epidermis, but there is no place in my sections where the epithelium appears to take any part in the composition of the neoplasm. The latter has the usual structure of a melanotic sarcoma; cells of various sizes and shapes, some with and some without pigment granules in the protoplasm, separated from each other by a delicate and variable amount of intercellular substance, showing, in some places, a distinct fibrillation. There are some very deceptive spots in the sections, where it looks as though the pigmented cells extended into the epidermis, apparently indicating that the epithelium is implicated in the growth. Careful examination of these spots has led me to believe that they are places where a papilla containing the sarcoma has been cut so that only a thin layer of it, overlying the neighboring

epithelium of the epidermis, is included in the section. These spots are what made me hesitate when trying to arrive at a diagnosis from the first and thicker sections. I think the specimen has grown from one of the pigmented moles, and that its chief peculiarity lies in the fact that it is so superficial and has spread almost entirely in a lateral direction."

MULTIPLE SARCOMA; GROWTH WITHIN THE LUMEN
OF THE PULMONARY VEIN PROJECTING
INTO THE HEART.

DR. DENNIS presented the heart and some of the attached organs from a case of multiple sarcoma of rapid growth. The point of interest was the fact that the growth involved the lumen of the pulmonary vein and from it had penetrated into the cavity of the heart.

DR. STIMSON remarked that four or five years ago he had seen a case of sarcoma of the suprarenal capsule on the right side which had spread into the vena cava, a part had broken off and caused sudden death by pulmonary embolism.

CYSTIC DEGENERATION OF SUBMAXILLARY GLAND.

DR. WYETH presented a specimen, consisting of the left submaxillary gland, which had undergone cystic degeneration. The tumor had begun sixteen years ago, had steadily increased, had been tapped from time to time; lately it had grown more rapidly and caused complete destruction of the gland by cystic degeneration. The only case of complete destruction which he had seen.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 3, 1894.

The President, DR. WILLIAM HUNT, in the Chair.

PARTIALLY ENCYSTED VESICAL CALCULUS.

DR. H. R. WHARTON exhibited a dumb-bell-shaped calculus which he had removed from a six-year-old child by lateral lithotomy. After exposing the stone and attempting to grasp it, he found that it was impossible to remove it, as the posterior portion was thoroughly surrounded by the walls of the bladder. He dissected it out with his finger without breaking it. The patient after the operation did perfectly well. He showed the specimen mainly for the purpose of calling attention to the difficulty of crushing stone under such circumstances. He had done litholapaxy in a child five years of age. The operation is a satisfactory one if you can completely crush the stone. In the case mentioned he used a No. 16 lithotrite, and had no trouble in crushing and removing the stone. The day after operation the urine was clear and the temperature was normal. The patient made a satisfactory recovery.

EXTENSIVE DESTRUCTION OF THE INTEGUMENTS CURED BY TRANSPLANTING LARGE FLAPS.

DR. WILLIAM B. HOPKINS presented a man, John J., aged thirty-two, who was admitted to the Episcopal Hospital, November 9, 1888, with an extensive laceration of the elbow, involving skin, superficial and deep fasciæ. The injury was caused by a centrifugal dryer in a sugar refinery. A month later, December 7, an ulcer occupying the entire circumference of the elbow, consequent upon the original loss and subsequent sloughing of integument, remained. It extended from the middle of the forearm to the middle of the arm, or about ninety-six square inches in area. The following operation was then per-

formed: A vertical flap, five inches wide and nine inches long, consisting of skin and superficial fascia, the base of which occupied the upper left pectoral region, and the edges of which were nearly parallel, was lifted from the chest and sutured around the elbow, the limb being retained in the Velpeau position. Approximation of the enormous chest wound, though not complete, was materially facilitated by the emaciation following so severe an injury, and consequent relaxation of the integument of the chest. At the end of four days the flap was severed from its basic attachment to the chest, and the arm was released from its constrained position. There was epidermal sloughing of the flap after its severance, which caused considerable anxiety, but its deeper layers were soon found to have formed a firm attachment. The patient remained in the hospital 279 days. The limb will be seen to have perfectly healed, to be amply covered with a soft pliable integument permitting complete flexion and extension, pronation and supination, indeed, but that it is not quite so strong as the right arm, to have its functions entirely restored.

DR. HOPKINS also presented a second patient, a man, Anton D., thirty-three years of age, a fireman, who was brought to the Episcopal Hospital, October 25, 1892, with a railroad injury of his left foot. The extremity was so caught beneath the wheel that it had been completely flayed, but as none of the integument was lost it was brought together by sutures. Sloughing, however, occurred of the entire skin of the foot and ankle. December 4 a flap two inches wide was dissected from the sound limb, from the lower portion of the thigh to the lower third of the leg, a distance of fourteen inches, its base being left attached at the lower part. Carrying the lower portion along the outer side of the foot from before backward, the flap was reflected upon itself around the heel, and its remaining portion carried forward on the inner side of the foot to the toes. It was retained in this position by sutures carried deeply enough through granulation tissue to take a firm hold, and through the reflected lower borders of the flap occupying the sole of the foot. With a Y-shaped splint ingeniously devised by Dr. Ferguson, which kept the injured foot in a state of absolute fixation to the calf of the leg on the sound side, the patient, with remarkable fortitude, kept his limbs in this constrained position for over three weeks (twenty-two days), when the base of the flap was detached, the latter having become firmly adherent to the foot. Advantage was taken of this opportunity to gain a little more integument by dissecting the flap farther down the leg instead of cut-

ting it off level at the root. The patient remained in the hospital 657 days, at the end of which period he walked without a cane, and with a foot whose function was sufficiently restored to enable him to resume his laborious occupation of fireman on a vessel. The foot will be seen to be a very useful one, its plantar aspect being covered entirely by leg skin, as shown by the growth of hair upon it.

It will be observed in both of these cases that there is a singular freedom from the constriction of a tightly-drawn peripheral cicatrix, œdema, impairment of function, and other evidences of impeded return circulation. This factor alone places this method of closing large circumferential ulcers far in advance of the method by skin-grafting. Though the method of Thiersch and others, of allowing the flaps before severance at one or both extremities to become granulated, would have been applicable to the case operated upon six years ago, it is very doubtful if so long a flap as that transplanted in the other case would retain its vitality throughout its length, even if left attached at both ends.

Stated Meeting, January 7, 1895.

The President, DR. WILLIAM HUNT, in the Chair.

THE INDICATIONS AND NATURE OF TREATMENT IN
SEVERE ABDOMINAL INJURIES AND INTRA-AB-
DOMINAL HÆMORRHAGES UNACCOM-
PANIED BY EXTERNAL EVIDENCE
OF VIOLENCE.

DR. JOHN B. DEEVER delivered the annual address, announcing as his topic, "The Indications and Nature of Treatment in Severe Abdominal Injuries and Intra-Abdominal Hæmorrhage Unaccompanied by External Evidence of Violence."

He said, every surgeon has undoubtedly at some time in his experience, either in private or hospital practice, met with cases coming under the class covered by the title of this paper. These are cases in which the history and general condition of the patient give the impression that there is a serious lesion within the abdomen, and yet, upon examination, we find total absence or only slight evidences

of injury. The tendency, I fear with many, is to treat these patients tentatively, only to be awakened at the autopsy to the fact that a rupture or a tear existed in the abdominal cavity, which, by early radical operation, could have been relieved.

The mortality in these cases is appalling ; references to the literature of the subject will amply bear out this statement, which is readily accounted for by the nature of the injuries. Where the lesion is of the liver or spleen, if the patient does not die of shock or hæmorrhage, a violent peritonitis supervenes to which he shortly succumbs. If the liver, spleen, or kidneys are involved, death from hæmorrhage may ensue in a very short time. Should the stomach, intestine or bladder be ruptured, and their contents poured into the peritoneal cavity, death from peritonitis is the result. In rupture of the mesentery the danger is from hæmorrhage, yet, when the opening in the mesentery is small, a clot may form sufficiently large to control the bleeding. Should death occur under these circumstances it would be the result of peritonitis caused by the free blood in the peritoneal cavity. In ruptured extra-uterine pregnancy death is due either to hæmorrhage or peritonitis.

The usual history of these cases, with the exception of extra-uterine pregnancy, is that the patient has received a direct injury to the abdomen, which is found to be unaccompanied by external evidence. These injuries may result from railroad accidents, from being caught between shifting cars, or from blows upon the abdomen received in various ways.

The most prominent symptom is pain, which is accompanied by shock, the degree of which is dependent upon the extent of injury and the temperament of the individual.

The pain is peculiar and difficult to describe, but is readily recognized by one who has seen many of these cases and by the patient himself. It is not that of ordinary intra-abdominal affections, but is described by the patient as if something had given way or ruptured, and is usually accompanied by a consciousness of impending death. It is usually accompanied with tenderness, which will be more or less localized, unless the ensuing peritonitis be general. In the early stages of the injury, when shock is most profound, it may not be so pronounced, and if large doses of opium be administered it may be masked throughout the course of the trouble.

When vomiting is present, it is usually associated with pain. Rarely does the vomited matter contain blood.

There is often seen a characteristic rigidity of the abdominal walls, which is due to intra-abdominal irritation.

In the cases he had observed, consciousness had invariably been retained for varying periods of time. Restlessness is not usual in the early stages except in severe hæmorrhage, but later on, when peritonitis develops, it is not an uncommon symptom.

The pulse and temperature vary according to the degree of shock. The former is weak and running, varying from 100 to 160, and the temperature subnormal. If reaction takes place, the pulse becomes stronger and less frequent, and the temperature reaches the normal line. After reaction peritonitis is invariably the rule, and is accompanied by an accelerated and a high-tension pulse. The temperature under these circumstances is unreliable, as it does not correspond to the degree of inflammation or septic infection. A high temperature with a slow pulse is less significant than a rapid pulse with a low temperature. In cases of septic peritonitis, where autopsy revealed a belly cavity full of foul pus, he had seen the temperature run a normal course throughout the disease.

The part the sympathetic system of nerves, which has its largest distribution in the abdominal cavity, may play in injury to the abdomen is important in considering the differential diagnosis between the simple contusion and contusion accompanied by visceral lesion. In the former the absence of the severe and characteristic pain, of constant and persistent vomiting, of the anxious expression and presentment of impending death, and of any evidence of loss of blood, associated with the occasional presence of suddenly-developed meteorism, will usually be sufficient to establish the differential diagnosis. This condition of meteorism is due to paralysis of the muscular coat of the bowel consequent upon the concussion of the plexuses. There are cases, however, where it is very difficult to say definitely whether there be a visceral complication or not. Under these circumstances one can only wait for a comparatively few hours, when, if improvement is not apparent, the operative course is to be pursued. When the solid viscera are the seat of injury hæmorrhage will be the main source of anxiety. The pain and the exsanguination give the clew. If the patient should react, which is unusual, unless the kidney is the injured organ, we will find, in addition, dulness on percussion in the flank. Rectal or vaginal examination may afford aid in determining the presence of a collection of blood in the pelvis. The solid organs suffer most from external violence on account of

their fixity, density, and close proximity to the bony structures. The liver is the most often injured, then the uterus, spleen, and kidney, in the order named. The stomach is least often injured, there being very few such cases on record. Dr. J. W. Goff (*Medical and Surgical Reporter*, 1892) reports a case of ruptured stomach following a horse-kick of the abdomen, verified by an autopsy. The shock was profound, and there was vomiting with absence of blood. The author states that he believes immediate operation would have saved the patient's life.

In the *Glasgow Medical Journal*, 1894, Vol. XLI, Andrews reports a case of rupture of the stomach without external evidence of violence, in which all the symptoms of a serious visceral lesion were present with the exception of vomiting. The rupture was upon the anterior wall; was about an inch long, and involved all the layers. This case is one of special interest on account of the location of the tear and the absence of vomiting.

The liver is the organ most often affected because of its position beneath the ribs and against the spine, and because it is held firmly in place by strong ligaments and blood-vessels. It is most commonly ruptured on its upper surface, generally in the right lobe, and in a majority of such cases the injury proves fatal. Dr. H. P. Loomis (*Medical Record*, January, 1893) reports a case where the patient was struck by a pole protruding from the back of a wagon, which, when the wagon turned the corner, struck him on the right side, leaving no external evidence of violence. There was a three-inch tear in the right lobe of the liver and a pint of blood in the abdominal cavity. The patient died in the street before medical aid could reach him.

Mr. Battle (*London Lancet*, 1894) reports a case of rupture of the bile-duct, in a boy six years of age, who was run over by a handsome cab, in which there was but a slight shock without much pain or tenderness. Vomiting began early and persisted. On the fifth day slight jaundice developed. He was operated upon on the eighth day, and the abdominal cavity was found filled with bile. He died on the morning of the ninth day.

Autopsy.—Liver and gall-bladder were intact, but about half an inch beyond the junction of the cystic and hepatic ducts the common duct was found to be torn completely through. No other injury was found.

J. E., aged forty-six years, was admitted to the German Hospital, of Philadelphia, on November 17, 1893, suffering from injuries received

by being struck by a locomotive. He had a compound fracture of the lower jaw, lacerated scalp-wound, and fracture of four ribs on the left side, with no other signs of injury. He died six hours later. Post-mortem examination revealed a hæmatothorax of the left side. The peritoneum was not perforated or otherwise injured, but the peritoneal cavity was filled with blood. The spleen was completely comminuted, and the left kidney had been forced from its bed and was floating in the retroperitoneal space. There was an extensive hæmorrhage between the layers of the mesentery, and a hæmorrhagic extravasation of the posterior wall of the stomach.

H. M. C., colored, aged sixteen years, was admitted to the German Hospital on the evening of December 3, 1894, with the following history: While playing about some moving freight-cars he was accidentally caught between the bumpers, sustaining an injury to his abdomen. Examination upon admission failed to disclose any evidences of external injury. The introduction of the catheter drew clear urine. There was a moderate degree of shock, and the patient complained of severe pain in the abdomen and tenderness on palpation. Further investigation proved negative.

When examined by Dr. Deaver, upon the following day, it was very evident, from the severity of the abdominal pain and tenderness associated with very decided rigidity of the abdominal walls, that he was suffering from a serious intraperitoneal lesion. It was decided to open the abdomen at once. As soon as the peritoneal cavity was opened a large quantity of dark liquid blood escaped. The small intestines were delivered, when the cause of the lesion was found to be a ruptured mesenteric vein, the bleeding from which was arrested by the presence of a large diffused blood-clot occupying the interval between the layers of the mesentery. To make sure that there was no other lesion, the large intestines, the stomach, the liver, and the spleen were carefully examined, but with a negative result. The abdominal cavity was washed out with warm saline solution, glass drainage was introduced into the pelvis, and the wound closed. Recovery was uninterrupted.

L. C., male, Italian, aged thirty-five years, was admitted to the German Hospital, with a history of a fall of about fifty feet, striking upon his abdomen. He was profoundly shocked and exsanguinated. The only external evidences of injury were some slight cuts on the hands and head. A diagnosis of internal hæmorrhage was made, and the abdominal cavity opened up. Dark liquid blood escaped as soon

as the peritoneum was opened, and the source found to be the mesenteric vessels. The mesentery was torn half-way across and the intestines lacerated in four places. The mesentery was united with a series of catgut ligatures. The rents in the intestines closed with the Lembert sutures. The abdominal cavity was washed out with hot saline solution and closed. He died two hours after the operation. The autopsy demonstrated several tears in the gut which had been overlooked, and several grape-skins and pieces of fig in the peritoneal cavity.

The most common form of intra-abdominal hæmorrhage is that resulting from ruptured extra-uterine pregnancy. While these cases may be due to traumatism without any external evidence, they are usually spontaneous. While hæmorrhage from the pelvic organs of the female usually occur from a ruptured extra-uterine pregnancy, it may be due to other non-traumatic causes. Hæmatosalpinx may occur independent of pregnancy, and rupture either spontaneously or from traumatism. Again, degenerated blood-vessel walls, and especially veins, may rupture under similar circumstances.

M. E., aged twenty-four, nurse, admitted to German Hospital, January 20, 1893. While lifting a heavy weight from an elevator she felt something give way in her abdomen. This was immediately followed by severe lancinating pain in the right ovarian region. She was menstruating at the time. Pelvic peritonitis promptly set in. An examination demonstrated a tumor in the right broad ligament about the size of a hen's egg. The peritonitis and tumor subsided to treatment, and she made a slow recovery. Diagnosis, pelvic hæmatocele from rupture of an engorged ovarian vein.

Hæmorrhage itself is seldom the cause of death, but associated as it is with shock, the degree of which is out of all proportion to the severity of the accident, it is frequently fatal in a very short time. When the peritoneum is wounded, shock is still more profound, the so-called peritoneal shock.

Hæmorrhage within the peritoneum is sometimes very slight and distinctly localized, and may occur several times during the course of the illness. It may take place between the layers of the broad ligament, and soon stop from the pressure.

The two following cases of hæmorrhage from ruptured extra-uterine pregnancy illustrate typically the wisdom of immediate operation:

Mrs. A. K., aged thirty-one years, admitted to the German Hos-

pital, September 21, 1894, with the following history: Six months prior to admission she had been subject to attacks of vertigo, pain in the back and limbs, and for the last six weeks to a constant bloody vaginal discharge. Examination revealed a retroflexed uterus with a slight tear of the cervix, and the presence of a small movable mass behind and to the left of the uterus.

September 25, four days after admission, the patient was etherized, and the uterus was dilated and curetted. After the operation the discharge stopped, but the patient gained in strength very slowly. She was advised to submit to abdominal section, but preferred to wait until she was stronger. On the night of November 22 she awoke with a severe pain in the right side, and on attempting to walk to the water-closet fainted. After being returned to bed she again fainted, and went into a collapse, the pulse becoming almost imperceptible, and the temperature falling to 96° F. Under active stimulation she reacted. The diagnosis was made of internal hæmorrhage from rupture of a probable extra-uterine pregnancy.

The abdominal cavity was found filled with fluid blood and clots, and the right tube ruptured. The tube was tied off and the abdominal cavity flushed with hot saline solution, a glass drainage-tube introduced, and the wound closed. The patient was not much shocked by the operation, but, on the contrary, seemed rather improved. The drainage-tube was removed on the third day, the wound healed by first intention, and the patient made a good recovery.

Mrs. J. W., aged thirty-six years, was admitted to the German Hospital, November 21, 1894, with the following history: About two o'clock on the morning of admission she was seized with a violent pain in the lower abdomen. For this she took some whiskey, and was somewhat relieved. At nine o'clock the same morning she started for market, and was suddenly taken sick, becoming very weak and suffering from a violent pain in her abdomen. She returned home with difficulty, and was at once removed to the hospital. At the time of admission she was very weak, and there was distinct tenderness over the abdomen with slight dulness on the right side. Immediate operation was advised and consented to.

When the peritoneal cavity was opened it was found to contain fluid blood and clots. The right tube was the site of a small rupture, and was tied off and removed. The abdominal cavity was washed out with hot saline solution, glass drainage introduced, and the wound closed. The patient was very much shocked by the operation,

and reacted slowly. During the operation hypodermatoclysis was practised. The drainage-tube was removed on the fourth day, the wound healed by first intention, and the patient was discharged well on the twenty-third day.

The following case of hæmorrhage from ruptured extra-uterine pregnancy illustrates the danger of delay as strongly as did the two previous cases the efficacy of prompt interference:

Mrs. P., aged thirty years, was a patient of Dr. S. Cooke Ingraham, of Wissahickon, Philadelphia, who first saw the patient on January 29, 1892. She then complained of severe abdominal pains of a bearing-down character, and of a sense of fulness in the epigastric region. She had been married seven years, but had never been pregnant, and laughed at the possibility. For the previous three years the menstrual flow had been decreasing in amount, and for several months past had been very scant. The breasts were slightly enlarged, but the areolæ were not darkened. The glands of Montgomery were a little more prominent than normal. She had suffered from morning vomiting for the past month.

He was hastily summoned to see the patient on the morning of February 2, and found her in a state of collapse, pulseless, and with a temperature of 96.5° F. She reacted to active stimulation, and was sent to the German Hospital for immediate operation, a diagnosis of ruptured extra-uterine pregnancy of the tubal variety having been made. Upon admission her pulse and temperature were normal. She did not complain of pain. Examination of the abdomen and per vaginam and rectum failed to reveal any mass, although a circumscribed area of flatness could be demonstrated low down and to the right side. She continued in this condition until February 12, when at her own request she was discharged. On February 23 she was readmitted. At the time of the second admission the abdomen was markedly distended, being tympanitic above and flat below. Pulse 116, temperature 101.5° F. She complained of considerable pain.

The following day she was operated on, and when the peritoneum was opened a foetus with clots and fresh blood gushed out. The ruptured sac occupied the right iliac region, and was tightly adherent to the neighboring coils of small intestines, to the cæcum, and to the vermiform appendix. After a prolonged and tedious dissection the sac was enucleated. This was accompanied by very free bleeding, which necessitated packing of the cavity with gauze. The wound

was closed with the gauze packing *in situ*. The patient died the following day of hæmorrhage.

The immediate effects of an injury severe enough to cause a serious lesion of an abdominal viscus are sometimes so slight as to be misleading. Very often a patient with such a condition will walk to a conveyance or to the hospital, complaining only of a slight pain. In varying periods of time following the injury more decided symptoms will develop,—viz., signs of hæmorrhage if the solid organs be involved, and early peritonitis if the hollow viscera be ruptured or torn sufficiently to allow their contents to escape. When this occurs, operation is imperatively demanded without delay. This is also true of hæmorrhage consequent upon the rupture of an extra-uterine pregnancy, be it traumatic or spontaneous. In ectopic gestation operation will be necessary in every case at some period of its history; therefore, if a diagnosis can be made, or even a well-founded suspicion of the condition exists, rupture should not be allowed to occur. If rupture does occur, however, immediate interference is the only certain means of saving the patient's life. The longer the operation is deferred, the greater the risk to life. Hasty operations, often necessitated by the patient's condition, are likewise less liable to reach a favorable termination. Blood-clots or intestinal or gastric contents cannot be washed out of the peritoneal cavity except by prolonged and repeated flushing.

The almost universal fatality of intra-abdominal lesions of traumatic origin is so well recognized that it seems as if there could hardly be any question as to the wisdom of opening the abdominal cavity. The speaker would not be understood as meaning that abdominal section should be used as a means of diagnosis, but, on the contrary, he believed that every known means, with attention to the most minute details, should be exhausted in establishing a diagnosis. When a diagnosis is impossible, abdominal section is justifiable only when it becomes the last and only chance for the patient.

EDITORIAL ARTICLES.

BURGER ON THE SYMPTOMATOLOGY AND DIAGNOSIS OF EMPYEMA OF THE ANTRUM OF HIGHMORE.¹

OF the various walls of the antrum of Highmore the posterior one is the strongest. The tuberosity of the maxilla is so firm and solid that the clinician is rarely obliged to take cognizance of it. Next in strength is the facial wall; then the orbital; and, finally, the nasal, which in one portion—*pars supratubinalis*—is composed almost entirely of soft parts. The nasal wall, therefore, and not the facial, is the *locus minoris resistentiæ*. An evident distention of the canine fossa is by no means a common symptom, and is especially rare as a result of an "enclosed empyema." Its presence, on the contrary, indicates that something more than a simple empyema is present,—perhaps a neoplasm within the antrum.

The old method of basing the diagnosis of antral empyema chiefly upon the external swelling of the canine fossa is erroneous. The nasal wall and not the facial one is the most important field to investigate. Inspection of the nasal cavity, and not the mere palpation of the face, is the essential part of the diagnosis. Whoever judges of the condition of the antrum by the latter method alone treats the case as intelligently as if, in a case of suspected disease of the lungs, he were to confine his examination to the taking of the pulse, and looking at the tongue, and neglect percussion and auscultation.

The history of the case will in many instances lead to a correct diagnosis. When a patient, after suffering for some time from toothache, caused by a carious upper molar tooth, suddenly develops pain

¹ DR. H. BURGER, Amsterdam: Sammlung klinischen Vorträge, 1894, No.

around the eye, and pus begins to discharge continuously from the corresponding nostril, antral disease is certain. Equally suggestive is it when, after the subsidence of an acute nasal catarrh, the secretion recommences upon one side only, purulent, stinking, and profuse, followed shortly by a train of alarming subjective symptoms.

These subjective sensations group themselves about the diseased cavity in such a way that they appear to offer a secure support for the diagnosis. Pain over the cheek is often complained of, or a gnawing, boring, or nibbling sensation, as if an animal was burrowing within the bone. Pain referred to the upper teeth of the affected side is not infrequent; also a sense of pressure in the maxillary wall of the orbit. These various symptoms, however, must not be over-estimated. Infra-orbital neuralgia, together with a one-sided purulent discharge, occurs with empyema of the ethmoidal and frontal sinuses, and, on the other hand, may be entirely absent in antral disease. Supra-orbital neuralgia and oppressive or boring pain over the frontal sinuses are, perhaps, a more frequent accompaniment of the axillary sinus disease than is pain in the cheek. The headache, unilateral and unbearable in some cases, may be altogether absent in others. The same is true of the disturbances of cerebral functions,—loss of energy, apathy, dizziness, sleeplessness, somnolence.

All these troubles are either the direct result of the antral inflammation or they are indirectly dependent upon the empyema, and give symptoms of the diseased conditions caused by the constant presence of pus within the nasal cavity. From these secondary lesions a series of evils may develop, which sometimes become so prominent as to completely mask the true etiology. This is particularly true of the cerebral symptoms,—headache, lachrymation, disturbances of taste, smell, and hearing, spasmodic sneezing, and the whole list of reflex neuroses of the nose. The picture of the disease in its entirety is therefore a complex one.

Still another train of symptoms may arise when the pus constantly drains out from the antrum and trickles down upon the mucous membrane of the pharynx, posterior nares, and the larynx. David-

sohn¹ reports a patient suffering from a bilateral empyema, who for many weeks could not rest at night; when he lay down the pus ran back into his larynx and caused violent attacks of coughing. In a case which was treated by Burger himself the discharge of pus from one antrum caused such an acute pharyngitis that swallowing became very painful. Inspection of the fauces revealed the fact that the mucous membrane was flecked with pus, and this led to the discovery of the true nature of what had been diagnosed as a malignant angina.

The swollen mucous membrane not infrequently gives rise to the subjective symptoms of closure of the Eustachian tube; roaring or pressure in the ear, cracking in the ear after swallowing, decrease in hearing; all usually on the side corresponding to the diseased antrum. Digestive disturbances also arise, and it is no wonder that the continuous swallowing of a putrid secretion causes anorexia, nausea, and even gastritis.

Of the objective symptoms, fever may be absent, moderate, or extreme. It usually increases if the *ostium maxillare* is temporarily occluded. It varies with the nature of the infection, with the constitution of the patient, and with other similar influences. The anæmia, emaciation, and mental depression, which usually attend all chronic suppurative diseases, are not wanting in this disease.

Among the external symptoms, distention of the canine fossa is of rare occurrence. It is seen much more frequently as the result of a progressive periostitis, originating in a carious tooth; an empyema of the antrum may develop simultaneously from the same cause.

Exophthalmos, due to pressure upon the orbital wall of the antrum, is also a great rarity.

Fistulas are rare; the *ostium maxillare* nearly always remains open, and in those cases where it does close, the nasal wall being the weakest, is the side through which the abscess usually breaks.

Abscesses of the face and within the orbit, and the various forms of inflammations of the eye are not uncommon, for it is possible for

¹ Berliner klinische Wochenschrift, 1892, No. 27, p. 667.

the causes of suppuration to pass through the normal channels in the bone without a true perforation.

Swelling of the cheek, of the upper lip, of the oral mucous membrane, or of the gums themselves, is observed with relative frequency. These swellings are sensitive upon pressure, and may disappear with the same rapidity as they have appeared. They are usually the result of a temporary occlusion of the normal outlet, and when this again becomes patent they disappear.

Facial erysipelas is now and then observed.

Very frequently diseased teeth are to be found upon the side of the affected antrum. These may have been the starting-point of the empyema, or, on the contrary, they may have become involved as a result of that condition. It is a remarkable fact that in many cases where empyema has originated from carious teeth no diseased teeth are to be found; an examination shows either the presence of teeth that have been filled, or that the teeth have already been lost.¹ A careful examination of the mouth should never be neglected.

Most significant of all of the external symptoms is the discharge of pus from the nose, and this is often very characteristic. It differs from an ordinary catarrh by being upon one side only; the other nostril remains free from any discharge. It is possible for both sides to be the seat of an empyema. A purulent discharge limited to one side of the nose may be the result of an empyema of some one of the other accessory sinuses, or to the presence of a foreign body or the growth of a neoplasm. Another peculiarity of the discharge in antral disease is that it is, as a rule, more profuse in the morning. During the day the pus is more or less constantly removed; during sleep, on the contrary, an opportunity is offered for its accumulation within the nose, and these accumulations empty themselves as soon as the vertical position is again resumed. The *ostium maxillare* is very near the roof of the antrum, and so during the day the discharge is really an overflow. Should the patient lie upon the back or upon the sound side of the head the antrum will readily empty itself. The patient may

¹ See Walb, Erfahrungen, Bonn, 1888, pp. 11-31.

therefore be comparatively free from annoyance during the day, but be greatly distressed by the continuous discharge of pus into the pharynx as soon as he tries to sleep.

The symptoms, often show a marked periodicity in their occurrence; a time of comparative comfort is often followed by a copious discharge. This is doubtless due to a temporary stoppage of the exit, for the cessation of the discharge corresponds with the beginning of marked increase in the severity of general subjective symptoms. It is not uncommon to read in the history of a case that the painful headache, neuralgia, sleeplessness, and fever suddenly disappeared with the onset of a profuse discharge of pus from the nose. Not infrequently the patient himself will make the statement that a gathering in the head has broken its way out through the nose.

The inspection of the nasal cavity is the most difficult part of the examination. One of the first things which may attract attention is a projection of the antral wall towards the median line. This occasionally appears in the middle anterior part of the middle meatus, and according to the description of Hartmann,¹ who has observed it in half of his cases, it looks as if there were a second middle turbinated bone behind the first. The use of a sound will show that the swelling is bony in character, and not due merely to swollen mucous membrane. Moderate pressure upon this projecting wall with the galvano-cautery or even with the probe will penetrate the wall, and give direct access to the antral cavity.

This bony deflection must be carefully differentiated from the "lateral tumor of the mucous membrane," described by Kaufmann.² This latter form of growth which Kaufmann found in nearly every case of empyema, and which he regards as pathognomonic of the disease, appears as a large, long, slightly-raised mass, beginning high up in the nose and extending obliquely to the point of origin of the lower turbinated bone. The tumor is often so close to the septum that the middle turbinated bone is completely concealed from view,

¹ Deutsche medicinische Wochenschrift, 1889, No. 10, p. 190.

² Monatschrift für Ohrenheilkunde, 1890, Nos. 1-8.

and the growth may easily be taken for the bone itself. It is identical in structure with polypoid hyperplasias of the mucous membrane, and is probably due to disturbances in the circulation and nutrition of the mucous membrane, and not to the irritation of secretion.

Burger himself has never seen this form of tumor, although he has frequently observed a circumscribed swelling in the region of the *hiatus semilunaris*, not lying in the position described by Kaufmann, nor corresponding to it in form.

The most important point in the examination is to determine the exact place at which the purulent discharge enters the nasal cavity, in those cases where pus is found only in the vicinity of the *ostium maxillare* and in the *hiatus semilunaris*, and upon the convex side of the lower turbinated. When the secretion is abundant, it is frequently found upon the floor of the nose. In some cases the affected half of the nose is nearly completely filled with pus. This must be thoroughly cleansed with cotton swabs, and it is often found that, with the exception of the floor of the nose where the collection of pus is greatest owing to the force of gravity, the amount is greatest in the middle meatus and not in the upper portion nor between the middle turbinated bone and the septum. This point is of the greatest importance. The difficulty is to find out from which of the various cavities the pus comes. If upon repeated examinations it is found that the pus is always beneath the middle turbinated, and never upon the convexity of this bone, this argues against the involvement of the ethmoid or sphenoid sinuses, as their openings are above the middle bone. Beneath the middle turbinated, besides the *ostium maxillare*, are the openings from the frontal sinuses and from the anterior ethmoidal cells. The discharge from the frontal sinus usually appears at a point anterior to the antral opening. These various facts must usually be discovered by repeated examinations.

Empyema of the ethmoid cells cannot be diagnosticated merely from the place where the pus appears. A very abundant secretion is probably due to antral disease instead of ethmoidal, for with a profuse discharge from the ethmoid cells there is usually softening of the bone, which can be determined by the use of a sound.

It is of greater significance in the diagnosis of an empyema in the various sinuses, when, after the pus has been carefully wiped away, more appears at once at the same place.

After the nose has been carefully dried by means of pledgets of cotton, there can be observed, at times, the pulsating light reflex in the *hiatus semilunaris*; this precedes the reappearance of pus. The analogue of this appearance in cases where the ear-drum is perforated is well known. According to Schöller,¹ who first described this symptom, and Walb,² the acute hyperæmia involving the inflamed nasal mucous membrane produces pulsation in easily movable bodies, such as fluids, and this can be determined by means of reflected light. The appearance will usually be manifested at the place where moisture first appears upon the dried surface. Although this pulsating light reflex appears much more rarely in the nose than in the ear, when it is observed it is a valuable factor in making the diagnosis.

Finally, B. Fränkel³ has given us a means of diagnosis, which may often be used with advantage. After a careful cleansing of the middle meatus, the patient assumes for a short time a position with his head hanging down, and with the well side lower than the diseased one. Immediately after the patient assumes an upright position an examination is made and very frequently pus will be found in the middle meatus, and the corresponding side of the nose will be almost filled with pus. With empyema of the frontal sinus this will not occur, because the natural opening of this cavity is found in its floor. In ethmoid empyema, too, the phenomenon is but rarely observed; in any case the amount of pus which flows out will be much smaller.

The greatest difficulty occurs in those cases where no pus is found in the hiatus. The examination must then be frequently repeated, a task which, in most cases, does not remain unrewarded.

Ziem⁴ recommends that the secretion should be increased by

¹ Ueber die Anbohrung der Highmorshöhle, Inaug. Diss., Bonn, 1885, p. 23.

² Erfahrungen, etc., Bonn, 1888, p. 10.

³ Berliner klinische Wochenschrift, 1887, No. 16.

⁴ Monatschrift für Ohrenheilkunde, 1886, No. 4, p. 138.

means of internal administration of iodine. Whether this means is really of value for the purpose mentioned is problematical; but the analogy of a similar use of iodide of potash in obscure cases of pulmonary tuberculosis renders its value not unlikely.

Occasionally no pus is found, and yet the rhinological examination renders the probable presence of a purulent process within the nose. A constant moistening of the nose with pus from the antrum causes necessarily secondary changes, and when these are localized in the region of the ostium they form a basis for the diagnosis.

It is not uncommon to find one or more mucous polyps close to the *ostium*, which are doubtless caused by the suppuration. In other cases the growth may be in the form of granulation tissue about the hiatus. These granulations are rarely a continuation of the granulations within the antrum; at times, they indicate caries of the circumference of the ostium maxillare. The use of the probe will differentiate these various forms.

The most frequent secondary change in the nose is a swelling of the mucous membrane. This is either localized about the hiatus or diffused over the lower portion of the nasal cavity. It is to be remembered, however, in all of these cases that asymmetry, as a result of injury or deflection of the septum, is not uncommon in healthy persons.

A chronic dry catarrh is often observed in the nose. The mucous membrane appears dull, is atrophic rather than hypertrophic, and is covered with firmly-attached crusts. Why in one case, as a result of the action of pus, swelling or polyp-formation should occur and in another a dry catarrh is not known; but both conditions occur. A one-sided, dry catarrh is very significant of a local causation, and, in any event, a bilateral catarrh does not exclude the possibility of an empyema upon one side. Although an offensive odor can be present with a secondary atrophic catarrh, yet the peculiar thick, green-gray crusts and characteristic stench of *ozæna* have never been observed by Burger, as a consequence of purulent inflammations in the sinuses. On the contrary, in typical cases of *ozæna*

repeated examinations have not shown the disease to be caused by empyema, although, since Grünwald's¹ publication appeared, repeated attempts have been made to substantiate his statements in this regard.

Although in some cases the secondary changes just described aid us to recognize the trouble, they may, on the other hand, form a marked hinderance to our examination. At times it is necessary to free the nose from polypoid and similar growths before the examination can be satisfactorily made. If we have to do merely with a hyperæmic swelling, cocaine affords an excellent means of enlarging the field of examination. Ten minutes after the application of a 10-per-cent. solution to the swollen mucous membrane a local contraction has taken place, which greatly facilitates the examination.

Secondary changes, as a result of the purulent discharge, are not confined to the nose alone; they are found, at times, on the mucous membrane farther back, most frequently in the posterior nares, in the pharynx and the larynx. Taken in connection with the other symptoms, these more remote lesions have a certain diagnostic value.

Transillumination is the latest addition to the list of diagnostic methods. It is based upon the transparency of physiological normal tissue, and the opacity of pus. According to Heryng² and Vohsen³ the examination is made by taking the patient into a completely darkened room, and placing in his mouth a small electric light around which he closes his lips. Immediately the cheeks, the under eyelids, and the root of the nose appear out of the darkness in a clear rosy glow. The rays of light pierce through the roof of the mouth into the antrum and the nasal cavity, then through still another layer of tissue and the skin, before reaching the eyes of the investigator. If, now, the antrum on one side is filled with pus, the passage of the light is hindered and the corresponding half of the face remains dark.

Although in the majority of cases this method is trustworthy, it must not be over-estimated; nor is it the universal and unailing

¹ Grünwald, "Die Lehre von den Naseneiterungen," 1892.

² Berliner klinische Wochenschrift, 1889, Nr. 35, S. 774.

³ Berliner klinische Wochenschrift, 1890, Nr. 12, S. 274.

method of diagnosis, which some writers have maintained. Even in those cases where no pus is present, the asymmetry of structure in certain individuals will produce a corresponding asymmetry in the intensity of illumination.¹

As a result of Burger's personal investigations, he has discovered a phenomenon to which he attaches a still higher diagnostic value than to the illumination of the cheek. It is the transillumination of the eye. The light penetrates not merely the antral wall, but also is able to penetrate a part of the orbital wall, and even the fundus of the eye. The use of this illumination of the eye for diagnostic purposes was first proposed by Davidsohn.² He maintained that this pupil-phenomenon was of more value than the lighting up of the cheek, because the rays of light can reach the eye only after they have passed through the floor of the antrum. The smallest amount of pus in that location will stop the rays and leave the eye without illumination. On the other hand, the presence of a small quantity of pus will not prevent the lighting up of the cheek, as the reflected light from the nose, passing through the upper part of the antrum, will be sufficient to cause this phenomenon.

Unfortunately this method has its dark side, for in many normal persons no illumination of the pupil can be produced; this was the case in half of the persons examined.

One thing, however, appears to be a constant symptom, and that is the subjective sensations of light, caused by the presence of the lamp within the mouth. The action of the light upon the lower part of the retina gives a sensation of light in the upper part of the field of vision. That a person perceives two distinct visual impressions which do not form a single image is due to the fact that the affected

¹ Lichtwitz (*Bulletin médicale*, 1890, No. 86) observed that the diseased half of the face remained dark after the thorough removal of the pus. Burger also has frequently made the same observation, but does not regard this as an argument against the diagnostic significance of transillumination. It simply goes to prove that the opacity of the inflamed antrum may be caused by swelling of the mucous membrane, hyperæmia, and granulation tissue-formation, as well as by pus.

² *Berliner klinische Wochenschrift*, 1892, No. 27 und 28.

areas of the two retinae are not identical; in this lies the diagnostic value of the phenomenon. The patient receives upon each eye a separate sensation, and is able to tell if one or the other is wanting. But one person in all the normal cases examined by Burger failed to perceive the sensation upon both sides.¹ Of the patients suffering from empyema, all, without exception, declared that they perceived the light upon the healthy side only. Two patients who suffered from a bilateral empyema perceived no light upon either side, but as soon as the disease was cured were able to perceive it upon both sides. This method, therefore, seems to be applicable in all cases,² is easier to use, and, unless amaurosis exists, is much more certain in its results than the transillumination of the cheeks.

As in every other method of procedure, there are certain details of technique which must be learned by experience. The room must be completely dark. In estimating subjective impressions the patient should close the eyes, and hold them closed with the fingers. In examining the pupil the illuminated cheek must be covered. By beginning with examining himself and a number of healthy persons, the investigator will soon learn to overcome the difficulties of technique, and to correctly interpret the value of the various symptoms.³

When careful examinations fail to show positively that pus is present, exploratory aspiration or exploratory irrigation may be tried.

For this purpose the surgeon may drill through the nasal wall of the antrum from the anterior part of the inferior meatus, and then use a syringe to aspirate the pus. In most cases this is easily done. Cocaine is first used, and then a thick, curved, hypodermic needle is forced through the wall. Several different punctures may be needed

¹ This patient had had a variety of chronic nasal troubles, and had had several bony deformities removed.

² Even in the less intelligent class of people, notwithstanding Ziem's statement (*Monatschrift für Ohrenheilkunde*, 1892, No. 12), this phenomenon will be accurately noted.

³ See also Garel, *Annales des Maladies de l'Oreilles*, etc., 1893, No. 2.

to find the purulent collection, and if the results are negative, no positive conclusion can be reached; the pus may be temporarily drained away or it may be too thick to pass through the needle, or the tip of the needle may be embedded in a mass of granulation tissue.

More definite results may be expected from the methods of exploratory irrigation. Puncture should be given the preference only in cases of true "closed" empyema. Irrigation may be performed either through the ostium maxillare or occasionally the ostium accessorium, or through an artificial opening made in the nose or in the mouth.

Generally, irrigation is far better performed through an artificial opening made in the lower part of the antrum, in the alveolus, in the canine fossa, or in the inferior meatus of the nose.

Ziem recommended that the opening should be made by means of a dental engine in the space between the teeth, preferable between the second premolar and the first molar. Burger is much pleased with the dental engine as a means of making the opening, but regards the nose as the proper place through which the antrum is to be opened.

Burger recommends that a long, fine, straight trocar be passed through the antral wall from the inferior meatus of the nose, and that through this a weak antiseptic solution be injected; while the patient bends his head forward, the liquid as it escapes may be caught in a basin. The nose, of course, must be thoroughly cleaned beforehand.

These various methods of procedure should enable one to make the diagnosis of empyema of the antrum of Highmore with ease and with certainty. Whether transillumination or exploratory irrigation should be used is a question that must be decided according to the individual case: both methods are valuable, and each strengthens the other. Transillumination has the advantage of being absolutely harmless, and of being performed without the necessity of drilling through a bony wall; in connection with the other symptoms it gives a satisfactory diagnosis in the majority of cases. Where an element of doubt still remains, puncture or irrigation should be performed.

Periostitis and ostitis of the superior maxilla may have many symptoms in common with empyema of the antrum, and may also be caused by caries of the teeth. In these conditions swelling of the jaw is found, and after the removal of diseased teeth pus escapes. The use of a probe will now demonstrate in most cases that the abscess is situated in the jaw itself, and not within the antrum. In these cases the nose remains free from evidence of disease; this is also true when dental cysts develop on the anterior surface of the jaw.

The mucous glands of the antrum of Highmore occasionally show a tendency to form cystic enlargements. From the increase in size of such cysts extensive polypoid mucous tumors may result; filling the entire cavity, and by progressive growth may even cause a distention of the antral walls. So long as these are small they give no trouble whatever, but as soon as pressure upon the walls is exerted a series of subjective symptoms appear, which will usually direct the attention of the physician to the antrum. The absence of nasal suppuration, the lack of indications of inflammation, and the pressure upon the walls, are all evidences of cyst-formation. From a solid tumor or from an empyema the cysts can be distinguished by the undiminished transillumination. Indeed, it is probable that, when the antrum is distended in this way, the phenomenon of transillumination is more marked than upon the healthy side of the face. Voltolini,¹ in a case which he had diagnosticated as antral sarcoma, was astonished to find that transillumination was especially well marked upon the diseased side. Exploratory puncture will also serve as a mode of differentiation.

Malignant tumors of the antrum demand especial care in their diagnosis. When there is no distention of the wall, and yet there is some considerable secondary suppuration, this cannot, of course, be distinguished from a simple empyema of the antrum. In cases of obstinate empyema, after vainly using irrigation, insufflation, and the other modes of treatment in vogue, opening, curetting, and tamponnade of the cavity will be required, and even before this

¹ Die Krankheiten der Nase und des Nasenrachenraumes, 1888, Nachtrag.

the question of neoplasm will have been suggested and decided. In other cases, where a distention of the wall really exists but without suppuration, these facts, taken in connection with the darkness of the side upon transillumination, and negative results obtained by exploratory puncture and irrigation, renders a tumor very probable, and indicates that the cavity should be thoroughly opened and explored.

It will be at once perceived, after a careful perusal of this article of Dr. Burger, that the subject under discussion has been very carefully and thoroughly treated. The contents of this little brochure should prove of interest and value to the general surgeon and physician as well as to the specialist in rhinology.

H. P. DE FOREST.

SCHEDE ON THE NON-OPERATIVE TREATMENT OF CONGENITAL DISLOCATIONS OF THE HIP.¹

SCHEDE has since 1880 treated these cases by orthopædic methods, which have given him excellent results. Upon the ground of his experiences he holds that the congenital dislocation of the hip-joint is by no means the incurable condition which it has been supposed to be, and that under certain circumstances it cannot only be greatly improved, but brought to a complete anatomical cure.

His method rests upon the fact that in the vast majority of children with congenital hip dislocation, in whom no secondary changes have been caused by walking, a simple traction upon the leg and a slight abduction suffice to place the head in the acetabulum, and that, further, a moderate lateral pressure upon the greater trochanter is only necessary to retain the head of the bone in this position.

After the child has begun to walk, the prognosis is less favorable. By the end of the second year, certainly in the third, the changes have become so marked that simple manual extension no longer suffices to reduce the deformity. But in such cases the employment of

¹ Verhandlungen der deutschen Gesellschaft für Chirurgie, XXIII Kongress, 1894.

continuous extension by means of weights for a few weeks or months so restores the positions that, with abduction and pressure over the trochanter, the head of the bone may be made to go back into its place and remain so firmly that pressure upon the sole of the foot no longer causes it to ride out.

In order to combine the lateral pressure over the trochanter with extension, Schede has had constructed splint apparatus, which differs from the common splint of Taylor in that the abduction-hinge is transferred from its position above the flexion-hinge for the hip-joint at the upper border of the pelvic band, and placed a little below the flexion-hinge. The screw which regulates the angle of abduction does not now work against the pelvic girt, but against the upper part of the cuirasse, which extends up to the tip of the trochanter. This itself is changed into a two-armed lever, the hypomochlion of which is the abduction-hinge. The more the abduction, the stronger the pressure becomes upon the upper border of the thigh-piece against the trochanter major. The counter-pressure comes upon the sound side of the pelvis through the pelvic girt. In the application of the apparatus, the following cautions are laid down :

(1) In putting on the shoes no pressure should be exerted upon the hip-joint. The pressure should be counterbalanced by extension upon the leg.

(2) The abduction-screw permanently fixes the position which the physician wishes. It should be so arranged that it cannot be accidentally turned.

(3) When the shoe has been put on and the upper and lower leg pieces fastened, one person takes hold of the leg and splint and makes strong extension in the direction of abduction, while another fastens the pelvic girt.

This splint should be worn till a cure is effected. As repairs have to be made in such apparatuses, a duplicate should always be on hand. The child should not take a single step without the apparatus after the treatment is once begun. At night moderate extension of four or five pounds is kept up by the use of the air-pillow leg-girt.

The apparatus should be gone over and readjusted at least every six or eight weeks.

Schede presented before the Congress a number of patients treated after his method. The first was a fifteen-year-old girl, who, when she was eleven months of age, suffered an unfavorable prognosis from Martini and R. von Volkmann. For three months she was treated by Schede in moderate extension. The splint was then applied, and at the end of a year she was completely cured. For the sake of safety she wore for six months a short abducting splint. Since then she had had no treatment. The cure is absolute and complete. The function of the joint is normal, and nothing abnormal can be discovered about the joint.

He presented also a five-and-a-half-year-old girl, which he had begun to treat three years before; and a twelve-year-old boy upon whom he began treatment at the age of six. In these the treatment is not completed, but a good result is certain. They walked without splints without limp. The head is in the position of abduction; and when the leg is in normal position the head is entirely in place, and the trochanter is at the proper height. A slight dislocation can be detected when the leg is strongly adducted, and at the same time the thigh is pulled upward.

Schede also reports four children which came under treatment at the age of from five months to eighteen months. The duration of treatment was one to four years.

Eleven others, among which are the two cases presented, are nearly cured, and excellent results will be obtained in all. Treatment was begun at ages ranging from seventeen months to four years. Only the boy presented was six years old. They wore the splints from eighteen months to six years.

Great improvement has been secured in eleven more cases, in which treatment was begun at ages ranging from two to five years. In all of these a considerable period of treatment by extension had to be employed, though the head in all cases was brought into place and held there by the splint.

Among four cases somewhat older, eight to ten years, three patients after wearing the apparatus over a year were greatly improved, inasmuch as the leg was lengthened, and the gait much improved. They still wear the splint. The fourth case was made to discontinue the use of the apparatus because the parents lost patience with it.

In contrast to these, eight cases are reported in which the results are less satisfactory. In three the parents did not show the necessary interest, and the treatment was eventually abandoned. In six children, ranging from three to seven years of age, the secondary changes were so great that a reduction of the dislocation could not be accomplished. Orthopædic treatment was not tried in these cases. Two of the cases were operated upon and good results obtained.

In four other cases of children, from two to three years of age, the treatment was carefully carried out for some years, but no satisfactory result was reached. Two of these were cured by operation.

Schede has thus reported his experience with twenty-nine cases, —four cured, eleven almost cured, and fourteen but slightly improved, —of which the majority will have a good result. There are eight cases without result, and eight which were lost sight of, six of which were not adapted to the treatment.

Besides the fifty-one single cases, Schede has had thirty double dislocations.

He regards an early diagnosis of the greatest importance, as having a bearing of much moment upon the treatment and prognosis.

JAMES P. WARBASE.

CASTRATION FOR PROSTATIC HYPERTROPHY.

It is not two years since J. William White communicated to the American Surgical Association the results of his experiments for inducing atrophy of the prostate in dogs by removing their testicles, and pointed to the marked and speedy diminution of the prostate thus uniformly induced as suggesting the probability that in the hypertrophied prostates of men an equally marked shrinking would follow the same procedure.

Search in literature had enabled him to marshal in addition a very limited number of observations in comparative anatomy, recorded by Hunter, Owen, and Griffiths, that lent additional weight to his own investigations. To these could be added certain observations upon the atrophied condition of the prostate in eunuchs and one case where the growth of the external genitals had been arrested in boyhood. This was the sum total of recorded knowledge of the influence exerted upon the prostate gland by the testicles that at the time of the publication of White's memoir was in the possession of the medical profession.

The effects of the removal of the ovaries upon the uterus and upon uterine myofibromata were well known generally, and it is doubtless the fact that the similarity in structure between these uterine growths and the prostatic growths awakened in the mind of White the idea that it might be possible to affect the latter through the testicles as favorably as the former were affected through the ovaries and that prompted him to his experiments. The final suggestion of the therapeutic application of castration for the relief of prostatic hypertrophy, with which his memoir was concluded, was, evidently, not a haphazard idea, but was a logical deduction from an adequate and well-considered series of already established facts. The novelty of the proposition made its proposer show proper caution in recommending it to the attention of the profession, even after he had worked it out, and he forestalled unfavorable criticism by stating that he himself had not then formed definite and final convictions on the subject, but advanced the suggestion for the purpose of provoking discussion and trial.

It is quite evident that the Philadelphia surgeon, previous to the inauguration of his personal experiments early in 1893, had knowledge only of facts that were the common property of surgeons generally. Possibly the existence of a relation between the testicles and the prostate gland, similar to that known to exist between the ovaries and the uterus, had independently occurred to the minds of some surgeons before the publication of White's memoir. Mansell-Moullin

has since stated, in his little book on "Enlargement of the Prostate," that in November, 1892, he had discussed with a patient the advisability of trying such an operation, but that the patient declined to have the experiment made upon himself. Even this date was six months after the beginning of White's investigation of the subject, and at any rate Mr. Moullin seems to have himself regarded the proposition as a passing caprice, and to have dismissed it from serious consideration, for, notwithstanding the large number of cases of prostatic overgrowth that are continually demanding surgical relief for the most urgent suffering, he does not claim to have considered the subject again until after the publication of White's memoir, nearly a year later, since which time he has unreservedly advocated the operation.

Perhaps no surgeon ever received a greater compliment from another than Mr. Moullin has given Dr. White in the opening sentence of the chapter (XI) in the book referred to, p. 154, which is as follows:

"Removal of the testes is followed in a large proportion of cases, if not in all, by complete and rapid absorption of the enlarged prostate. This has now been proved conclusively. The gland entirely disappears; nothing is left but a little fibrous mass."

It is true that in the later paragraphs of this chapter the author does not specifically state that White had first demonstrated this fact by an elaborate series of experiments upon the lower animals undertaken for the express purpose of determining whether or not such an influence could be exerted upon the prostate by removal of the testicles, and whether, if so, it was sufficiently certain to justify the adoption of the procedure as a therapeutic resource in the prostatic overgrowths of men. It is to be presumed that Mr. Moullin did not think it necessary to restate in so many words what he knew that all the surgical world already knew. An implied compliment is always greater than a baldly stated one, and, although it would have been a much more graceful thing for the London surgeon to have fully and specifically stated the real character of the work that had been

done by his Philadelphia colleague, it was not necessary, for its omission could not detract from the well-earned credit which is universally ascribed to the latter for his masterly work. An undue sensitiveness has been displayed by some of the American medical journals as to the way in which Mr. Moullin has chosen to speak of Professor White's work, as if in some way the credit of the latter had been assailed, and an important question as to priority had been raised. There is certainly no ground for any of this feeling.

As to actual priority of performance, three months after the publication of Dr. White's memoir a Norwegian surgeon, Ramm, of Christiania, published (September, 1893) the statement that in April of that year, before the reading of White's paper, he had removed the testicles from an old man as an experiment for the purpose of producing atrophy of an enlarged prostate.

In some English and American journals there has been of late quite a number of communications upon various phases of this subject. Not the least interesting is the statement by Harrison, of London, that years ago a patient had requested of him that he would remove his testicles in the hope that it might benefit his prostatic disease! This the surgeon refused to do, and contented himself with subcutaneously dividing the vasa deferentia of his patient, and then "thought nothing further of it" until the fact was recalled by reading White's paper. Here, as far as information goes up to date, would seem to be the real father of the operation. For this man not only conceived the idea, but offered his own body for the performance of the experiment. It is to be regretted that Mr. Harrison did not take advantage of the offer, for, with the light of after events, it is quite apparent that he missed a great opportunity.

These questions of priority of mental conception, of suggestion, or even of actual performance are of little importance. As far as the surgical world is concerned, the fact is undeniable that the general serious consideration of the possible value of the removal of the testicles as a therapeutic measure in the treatment of prostatic hypertrophy dates from June 1, 1893, when J. William White read his

paper upon "The Present Position of the Surgery of the Hypertrophied Prostate" before the American Surgical Association. Without this work of White, the subsequently-published cases of Ramm would have attracted but little attention; the operations of Haynes and of many other surgeons which have since been reported would not have been made, and Chapter XI of Mansell-Moullin's book on "Enlargement of the Prostate" would never have been written.

L. S. PILCHER.

INDEX TO SURGICAL PROGRESS.

HEAD AND NECK.

I. Operative Treatment of Spasmodic Torticollis. By M. H. RICHARDSON and G. L. WALTON (Boston). The authors endorse the dicta of Noble Smith, that neither drugs, local applications, nor other general methods are of any permanent use in the treatment of well-established spasmodic wry-neck; and that electricity has failed to do any permanent good except in some recent cases which probably differed entirely in their nature from those referred to.

Nerve-stretching offers, also, too little hope to warrant its employment. Neurotomy is unattended with permanent benefit. The operation which alone offers hope of lasting benefit is the excision of a considerable portion of the nerve or nerves supplying the affected muscle. Neurectomy upon the spinal accessory nerve has been often done, and its status as an operative procedure has been established. Operation on the posterior cervical branches has been less frequently performed, but knowledge as to its methods and results is accumulating. It has been performed times enough to prove that, notwithstanding the extensive paralysis which it produces, the ability to maintain the upright posture of the head is not lost.

The experience of the writers is that the posterior rotators are generally affected on the opposite side, tending to assist rather than to counteract the action of the sterno-cleido-mastoid as regards rotation. They divide the muscles of the posterior group roughly into those which draw the head back, those which rotate, and those (the larger number) which do both. Following the classification of Ballance, in the second group are placed the inferior oblique and rectus capitis posticus major. These are supplied by the suboccipital nerve. Those which extend—namely, the rectus capitis minor, superior

oblique, and complexus—are supplied by the same nerve. The larger muscles which when both sides are acting extend, and when one side is acting rotate, include the splenius, trachelo-mastoid, and complexus. The splenius, trachelo-mastoid, and the complexus are supplied by the succeeding posterior primary divisions of the cervical nerves. All the rotators here considered turn the face towards the affected side, as opposed to the muscles supplied by the spinal accessory, which turn the face away from it.

The posterior muscles appear to be more powerful than the anterior group. In most cases resection of the spinal accessory should be first resorted to, partly in the hope that the whole trouble will thereby be relieved, and partly to enable a more exact study to be made of the muscles involved, after paralysis of the trapezius.

The best incision for exposing the spinal accessory nerve is along the anterior border of the sterno-cleido-mastoid muscle, where the nerve, passing obliquely downward and backward from the jugular foramen, is crossed by the fibres of the muscle. This point will be found about an inch and a half below the mastoid process. The centre of the incision, which need not be over an inch and a half in length, should be, therefore, an inch and a half from the tip of the mastoid process. After crossing the internal jugular vein the nerve lies upon the precervical muscles and fascia. It is usually found with ease by careful dissection just above and internal to the point where it passes behind the muscle.

This nerve varies considerably in size and strength. It sometimes fails to follow the usual course. In one instance, in a dissecting-room subject, the spinal accessory came from the anterior divisions of the second and third cervical nerves; it was impossible to demonstrate the position of the nerve in this subject without extensive dissection of the deep parts. Had this very unusual variation existed in the cases operated upon, the search would have been unsuccessful.

As soon as the dissection, carried directly backward towards the prevertebral space, exposes the fascia covering the rectus capitis anticus major, the nerve usually is seen, especially if the dissection has

been bloodless. A dry and bloodless field seems a sufficient advantage to justify great care in controlling hæmorrhage as the operation proceeds, for with everything stained with blood it may be extremely difficult to find this nerve even within the narrow limits of its normal position.

Finding the exact position of the nerve may be facilitated by irritating it with the nail of the index finger,—drawing the nail firmly across the bottom of the dissection at right angles with the nerve, and at the same time pressing firmly backward against the cervical bodies. In this manner the filaments are irritated enough to cause a sharp contraction of the sterno-mastoid and trapezius muscles.

The nerve having been distinctly isolated, it should be drawn out of the wound as far as possible and cut. Both extremities may be stretched enough to allow the removal of at least two inches of nerve tissue, or the main trunk may be grasped with forceps and avulsed in both directions. The authors have never torn out the spinal accessory in this manner, however, on account of the danger of injury to the structures in the jugular foramen and at the base of the brain.

After division of the nerve the sterno-mastoid becomes at once flaccid; the head can be brought easily into normal position, and, if necessary, kept there. Little is accomplished by fixing the head for some days after dividing the nerve, however, and its discomforts are so great that it is not recommended.—*American Journal of the Medical Sciences*, January, 1895.

II. Methods of Cheiloplasty Applicable to Cases where there is an Extensive Loss of Substance of the Lips. By Dr. P. BERGER (Paris). Among cases of extensive loss of substance of the lips, the nearly total destruction of the lower lip as a result of burns, lupus, or syphilitic ulceration is the most common, and occurs in one of the following forms:

(a) The mucosa remains, the skin only is destroyed: in this case the mucosa is turned outward, and its free border is attached more or less low down upon the chin by cicatricial contraction; a true

cicatricial exstrophy of the lower lip exists. These conditions are most favorable of any for autoplasty; the Italian method is especially applicable to such cases. The free border of mucosa is divided and dissected up till it is quite free from attachment to fibres of the orbicularis muscle. In the same manner the cicatrices of the chin are made free as far as the subhyoid region. The entire anterior aspect of the chin and lower lip is then covered in by a large flap from the arm, which is left attached to the arm and secured to the chin by sutures until it unites. At the end of from eight to twelve days the pedicle is divided, and the flap is neatly trimmed and approximated to its new position.

(b) The mucosa has been partially destroyed at the same time that the skin was, but a part of the free border of the lip remains, and is attached to the cicatrix. In this case use the following technique: find and release whatever remains of the free border of the lip, following the margin carefully, and loosening the mucosa so that the buccal orifice is enclosed by mucosa, even though it be a trifle small. Then release the portion of the scar which is adherent to the jaw, and form a flap whose base is continuous with the alveolar border; loosen this flap with its cicatricial surface towards the buccal cavity in such a manner that it will form the inner surface of the lower lip. The bridge of mucosa, which was first constructed, is now sutured to this new flap so that it forms the free border of the lip. A flap from the arm now is used, as in the first case, to close in the raw surface of the lip; or in some cases, where the space is not large, a sliding flap from the subhyoid region will answer fully as well.

(c) It may also happen that all of the parts which make up the lip have been destroyed, there remains neither skin nor muscles nor mucosa nor free border. The entire lip must be reconstructed. In such cases the new skin and mucosa must be obtained from the cheek and carefully joined to the edge where the loss of tissue ceases. A sliding flap one or two finger-breadths wide is made in the cheek, or, if necessary, one from each cheek, which are joined on the median line. The opening in the cheek is closed by suturing the opposite sides together.—*French Congress of Surgery*, Session of 1894.

CHEST AND ABDOMEN.

I. Five Gunshot Wounds of the Intestine and Mesentery; Laparotomy; Sutures; Recovery. By Dr. WILLIAM H. CARMALT (New Haven). The patient was a lad of between twelve and thirteen years of age, who had accidentally shot himself, at about 11 A.M., with a 22-calibre revolver, held in immediate proximity to the abdomen. When seen there was no pain in his abdomen, and the only soreness he would acknowledge was directly at the point of entrance of the bullet, which was about half an inch to the left of and a little above the umbilicus. The wound was about a quarter of an inch in diameter, with discolored edges, and his trousers and shirt (the only garments he wore) had perforations in them corresponding to the situation of the wound.

The wound was explored, and found to go nearly perpendicularly to, but slightly downward and outward and evidently entirely through, the abdominal wall. An incision was carried along the track of the wound, and continued to and then along the median line. No blood appeared in the abdominal cavity, and at first no evidences of injury to the contained organs, but on drawing the intestines out, protecting them at the same time by keeping them wrapped in moist, warm, aseptic towels, and passing them gently and rapidly through the fingers, in search for an injury, a double perforation in the upper part of the small intestine was revealed. These perforations were evidently the points of entrance and exit respectively of the bullet, and were separated by about half an inch of sound tissue. These were sewed up as one wound, using very fine silk, by the Lembert suture. Continuing the search, two other very similar wounds were found in the large intestine, which were treated in the same way, and later a single perforation of the mesentery directly at its junction with the intestine. In all five separate wounds were found. No escape of the contents of the intestine had occurred, and, as mentioned, there was no hæmorrhage; but the bullet and two small pieces of cloth were found. In the latter the patterns of the shirt and trousers were to be

recognized. The intestines were then replaced, the abdomen thoroughly flushed out with warm boiled water, and the external wound closed with silkworm-gut sutures.

He had eaten nothing that morning. He had drunk some milk about an hour before the accident, and was waiting for his dinner. This accounted for the empty condition of his stomach and bowels, and the absence of fæcal extravasation through the intestinal wounds.

The recovery from the anæsthetic was followed by nausea, lasting for several days, but there was no complication that could be referred to the abdominal wounds. On the sixth day there was an elevation of temperature reaching to about 102° F. The bowels moved in the course of the first week. Later he had two severe attacks of intestinal colic, owing to indiscretions in diet, but these passed off happily, and five months after the operation he is as well as he ever was, doing all the work and play incident to his surroundings and age.—*Yale Medical Journal*, January, 1895.

II. Thirty-five Cases of Surgery of the Stomach. By Dr. MONTAZ (Grenoble). These cases include six gastrectomies, six gastrotomies, ten gastro-enterostomies, two enterostomies, and eleven exploratory laparotomies.

The six gastrectomies resulted in three cures and three deaths, the last due to collapse following the operation. Of the others, two made a rapid recovery; the other was under treatment for a year. The operations were done for small and movable tumors. The operator rapidly isolates the tumor by tearing away with the fingers the omentum and the gastro-hepatic omentum, places two Richelot clamps faced with rubber at a sufficient distance from the tumor, and cuts away the tumor-mass between them. The divided edges are then sutured after the manner of Doyen.

The six gastrotomies, done for cancer of the cardiac end when complete ablation was impossible, gave six operative cures. In this operation Montaz follows exactly the technique of Terrier, but in spite of the narrowness of the orifice, he has always noticed a dis-

charge of gastric juice and a partial digestion of the wall. He has vainly tried all sorts of remedies to prevent this digestion, the "ster-esol of Berlioz."

The ten gastro-enterostomies gave seven cures and three operative deaths. All the latter were due to collapse. The anterior operation of Wölfler was always used. Three of the patients who recovered have regurgitation occasionally after eating. The lateral position lessens this trouble, and Montaz believes that the duodeno-jejunos-tomy of Jaboulay is a useless and serious complication.

Two enterostomies were performed upon patients suffering from extensive involvement of the stomach in cancerous growth, and in whom alimentation had become impossible. The jejunum was identified, and an opening in its walls was made just as in a gastros-tomy. Through this the patients were fed, and both of them lived some months.—*French Congress of Surgery*, Session of 1894.

H. P. DE FOREST (Brooklyn).

III. Case of Recovery from Perforating Typhoid Ulcer after Abdominal Section and Drainage. By Dr. ROBERT ABBE (New York). The patient, a woman, twenty-one years of age, at the end of three weeks of typhoid fever, convalescence having begun, developed symptoms of perforation of the bowel. For two days she was treated by poultices and opium, when Dr. Abbe saw her. Her abdomen was then greatly distended; pulse, 140; temperature, 104° F.; lower part of hypogastrium dull. A median incision below the navel exposed distended coils of deeply-congested and greatly-inflamed intestine, smeared with sticky lymph. The pelvis and lower abdomen were filled with a collection of foul, purulent, and fetid intestinal extravasation, feebly confined by matted coils of intestines, loosely glued together, that broke apart on being touched, but which, being recognized, enabled him to introduce clean sponges under the upper abdominal wall. Two pints of foul purulent fluid and thick lymph were cleaned out, and the abdomen irrigated with warm sublimate solution, 1 to 20,000, followed by plain warm-water irrigation.

On the lower part of the ileum were then seen many thick oval patches, in one of which was a gangrenous perforation, a quarter of an inch in diameter, from which intestinal contents were seen to pump out. This was closed by interrupted silk sutures, over which two layers of mattress stitches were placed. A large abdominal tamponnade of iodoform gauze was placed within the abdomen and pelvis, and no attempt made to close the wound. An enema of hot, black coffee and whiskey was given, and the patient put back to bed three-quarters of an hour from the beginning of etherization. At the end of forty-eight hours she was in good condition, except for tympanites. The tampon was changed, and five grains of calomel given. A little fluid fæces leaked from the wound after the calomel action; this continued for two weeks, when it ceased. The abdominal wound closed in rapidly by granulations, forming, finally, a narrow and firm scar. The convalescence was rapid.—*Medical Record*, January 5, 1895.

MALE GENITO-URINARY ORGANS.

I. Double Castration for Relief of Enlarged Prostate.

By Dr. FINNEY (Baltimore). The patient complained of inability to urinate and constant dribbling of urine, dating back two years. He had to resort to the constant use of the catheter. Examination of the prostate showed it to be very much enlarged. The urine contained a trace of albumen, very few casts, slight amount of pus; was acid, and specific gravity 1014. Upon catheterization 420 cubic centimetres of urine were drawn off. The capacity of the bladder was about 1000 cubic centimetres. The bladder was much dilated and atonic. Examination for stone, negative. The patient was put upon the regulation treatment, washing out the bladder, regular catheterization and the usual internal medication. Still he was unable to void his urine, so the operation of castration was performed September 22, 1894. On the sixth day following he urinated unassisted, and since that day, with one or two setbacks, he has done well. He has had occasional attacks of pain in the right side along the ureter and over the kidney, after which there appeared a little pus in the

urine, but nothing more definite. Five weeks after operation, the lateral lobes of the prostate were just palpable to the right and left of a silver catheter previously introduced. They were soft, not tender, and showed marked atrophy. There was then not more than fifty cubic centimetres of residual urine; total amount, 1200 to 1500 cubic centimetres. He urinated about seven times in the twenty-four hours. In other respects he was in very good condition.

More recently Dr. Finney has operated upon a second patient where trouble was of five years' duration, with inability to urinate for two years. The prostate was much enlarged; the urine contained pus and albumen in small amount. From frequent and rough using of the catheter a false passage had been made, and, later, catheterization became very difficult and painful. For this reason the operation of castration was advised. He began to urinate without difficulty five days after operation.—*Johns Hopkins Hospital Bulletin*, December, 1894.

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THE PARIETAL INCISION IN ABDOMINAL SURGERY.

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IN the earlier days of abdominal surgery, when everything was good if only the life were saved, little attention was paid to the parietal incision either in the making or the closing of it. Provided that it gave easy access to the abdominal work, and that it healed kindly, little more thought was given to it. Now that the prime end of life-saving has been secured we are able to devote a closer and keener attention to the ways of making and of closing the incision in the parietes. It is my purpose in this paper to try to set out and discuss the leading principles which ought to guide the enlightened surgeon in this subsidiary but not unimportant part of abdominal surgery.

The first requisite of the abdominal incision is, of course, that it shall provide easy or at least satisfactory access to the work to be done. Every other consideration must give way to this. The next requisite is that it shall not appreciably add to the patient's risk. Admitting these leading requisites there are still many subsidiary issues which demand attention. Such are, the securing of provision against the occurrence of ventral hernia; the selection of a point in the parietes most suitable for the fixation of a hollow viscus or the wall of an abscess or cyst; the provision of muscular sphincteric action around a fistula; the making of an incision through which both exploration and treatment may be carried out. The one incision must seek to meet all requirements; and thus, seeking to unite a maximum of

advantages with a minimum of disadvantages, immediate as well as remote, many incisions will be, in a fashion, compromises. But always provision of room and avoidance of risk must be the leading motives. For example,—probably the worst incision possible as regards weakening of the parietes is a transverse section of the recti passing on through the linea semilunaris; but such an incision is the best possible as providing easy access to deep underlying work. In such an operation as pylorotomy, with fixation of growth and perhaps enlargement of glands, the urgent necessities of the freest access and of the saving of life would make us throw aside all remote considerations as to ventral weakening or protrusion. A vertical incision in the middle line or passing through fibres of the rectus cramps the space for operating, but leaves no risk of hernia. In an actual case other considerations would arise. Thus with thick muscular parietes, a deep abdomen, and a necessity for extensive and delicate work inside, a transverse, or partly transverse, section of rectal fibres would be adopted. With thin or lax parietes, a shallow abdomen, a mobile growth, and no likelihood of delicate work inside, a vertical incision with separation of muscular fibres would be sufficient. In other cases a combination of methods would be adopted; perhaps a primary and harmless incision for diagnosis and guidance; and a continuation of it for the operation regardless of everything but the saving of life and the provision of room. With this concrete and extreme example before us there is, I trust, no possibility of misapprehending the relative weights to be given to the principles and practices to be considered

CONSIDERATIONS INVOLVED IN THE SELECTION OF THE INCISION.

The principles involved in the selection of the incision will be discussed separately in their relations to muscle; to fascia; to the gross structure of the parietes in regard to thickness, density, and mobility, and to the length of the incision. Then a practical and critical exposition of these principles will be made with regard to the common incisions in use. Lastly, the practical closure of the incision and the cure of parietal and umbilical hernia will be described.

The Abdominal Muscles.—There is no doubt that the presence of intact muscular fibre is the best provision against hernia. Hernia takes place through fascial tissues, not muscular. Any transverse division of muscular fibre leaves a permanent and irremediable weakness at the seat of division. However closely and accurately the divided fibres are joined, the cicatrix will stretch. And a further and additional weakness is caused by the atrophy of the divided ends for some distance away from the cicatricial union. Nothing can prevent this. Close suturing may keep up close apposition for months or even years, but stretching of the uniting scar will certainly take place in the end, with subsequent weakening of the parietes or hernia.

It may, therefore, be laid down as a first law or principle that *the line of parietal incision should be made parallel with the direction of the most important muscular fibres.*

The Parietal Fasciæ and Aponeuroses.—Fascia, like muscle, once divided can never be replaced. The new tissue is the same for fascia as for muscle, and is equally capable of being stretched. The tensile power of a thick aponeurosis like that of the external oblique is enormous; the thin strip of cicatrix which unites the divided ends of such an aponeurosis is quite inadequate to bear the original strain. If there is one intact layer of muscle behind or in front of a divided fascia, the risk of hernia is much diminished. And, also, if intact muscular fibres are set parallel to an incision through fascia the risk of hernia is lessened. The division of the linea alba or the linea semilunaris would be followed by hernia more often than it is were it not that the sheath of the rectus is very frequently opened and the muscular fibres directly brought into the wound region. Transverse division of aponeurotic fibres is most harmful where muscle above or below is thinnest; where muscle is abundant, as in the lumbar region, division of aponeuroses is least harmful.

A second law may be laid down: *Separate where possible and do not divide aponeurotic fibres; where division is necessary, let it be in a direction which will permit of the leaving intact one or other of the muscular layers behind the division, or in front of it, or parallel to it.* If no one of these practices is possible,

then a *flap entrance* should be made,—that is to say, the weak points do not all overlie; they are at different levels in the parietes when union is made. We might reflect skin and aponeurosis, and open muscle at the base of the flap in the lower abdomen; or we might reflect skin and muscle in a flap near the edge of the ribs, and open the deep fascia (here very strong) at the base of the flap.

The Condition of the Parietes as to Thickness, Density, and Fixity.—Considerations having in view the gross condition of the parietes as to excessive thickness, density and incapability of being dilated, and fixation close to any of the bony margins, must influence us occasionally.

Thus, enormous thickness from fat or from fat and muscle combined would forbid any incision in the lumbar region, through which intestine might have to be brought. Again, although we get nearer to the colon by an incision carried well back in the loin, the advantage is nullified by the thickness of the parietes here, making it difficult to separate them, and closing in upon the work right down to it. On the other hand, an incision through these parietes is more easily separated and leaves a free space around the seat of operation. As to fixity of parietes, the difficulty would be well exemplified in the case of a powerful muscular man in whom it was necessary to suture a rent in the bladder low down. To get mobility of incision, it is not wise to go too close to the ribs or the crest of the ilium or the pubes, then the opening cannot be easily depressed or moved about. It often saves in length to have the incision mobile over the work.

A third law may be made: *Keep away from the bony margins, and avoid the thickest and least mobile parts of the parietes.*

Length of Incision.—A mean that gives free access to the work and will not unduly add to the weakness of the abdomen and prolong the operation in its suturing is to be sought. Often the length of the incision is determined by the tumor if it is solid. The seeking should be for shortness; better put up with a little extra difficulty for a minute or two than add an inch to the length of the incision. But no serious detail should for a moment be rendered more difficult to deal with for the sake of avoiding a

prolongation of the incision. The actual length of the incision must have directly an infinitesimal influence on the mortality. Indirectly by prolonging the time to be given to the operation it would influence mortality more. And remotely a long incision adds by so much as its length to the probability of the occurrence of ventral hernia. In some operations the length of the incision is simply the space between encroaching bones. Here the length is limited for us.

As regards weakening of the parietes, the length of the incision is of less importance than its direction. Thus an incision passing between the fibres of the rectus in their whole length would be less likely to result in hernia than a transverse incision through the fibres an inch or two long. When fibres are separated, a longer incision is necessary than when they are divided, but the ultimate result to the patient is better.

The fourth law is: *Let the incision be as short as is consistent with efficiency. A long incision with separation of muscular and aponeurotic fibres is better than a short one with division of fibres.*

With the help of the accompanying figures (1 and 2) an attempt may be made practically to apply the principles enumerated. They are intended to show the situation of the usual incisions made through the parietes and their relation to the direction of the chief muscular and fascial fibres. The external oblique muscle is shown in groups of parallel lines; the internal oblique in single wavy lines; and the transversalis in interrupted single lines.

In Fig. 1 the incisions are shown on the anterior aspect of the abdomen.

Incision No. 1, in the middle line between the xiphoid cartilage and the umbilicus, gives access to the greater part of the stomach; through it, if the parietes are lax and thin, most of the operations on the stomach may be performed. If it is made a little to the right, freer access is given to the pylorus; moved towards the left, the body of the stomach in operations for perforation or the removal of foreign bodies would be more easily reached. Where the stomach is contracted, however, and where it has to be fixed and opened (gastrostomy), and the most direct

access is essential, such an incision as No. 12 is usually more suitable. Incision No. 2 divides the fibres of the rectus, but gives very free access in such a delicate and difficult operation as

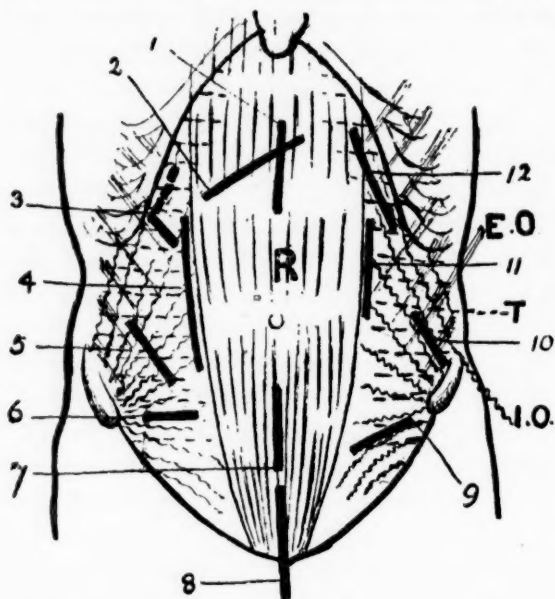


FIG. 1.—Diagram to show relations of chief incisions to directions of muscular fibres in anterior abdomen.

E. O. External oblique muscle (=====).

I. O. Internal oblique muscle (~~~~~).

T. Transversalis muscle (---).

1. Incision for gastrotomy, gastrorrhaphy, hepatotomy, etc. (left lobe).
2. Pylorotomy,—special cases.
3. Cholecystotomy,—the dotted line an addition for deep operations on the ducts.
4. Langenbuch's incision for nephrectomy, colectomy, etc.
5. Incision for operations on cæcum and appendix vermiformis.
6. Incision for evacuation of collections in broad ligament.
7. Ovariectomy and operations on uterus and appendages.
8. For operations on bladder and symphysis.
9. Another incision to expose collections between layers of pelvic peritoneum.
10. Colostomy, colectomy, etc.
11. Short Langenbuch's incision,—kidney, spleen, tail of pancreas, etc.
12. Gastrotomy.

pylorectomy. Such an incision leaves the abdominal wall permanently weakened.

Incision No. 3 (gall-bladder operations) has regard to the fibres of the external oblique, which here are, perhaps, the most important, and the incision separates but does not divide them. An incision skirting the margin of the ribs and following the fibres of the internal oblique is almost quite as good. For deep operations on the ducts, an additional incision (shown in dotted line) along the margin of the ribs and following the internal oblique fibres adds greatly to the space without materially weakening the wall.


No. 4, a long Langenbuch incision through the *linea semilunaris*, gives transperitoneal access to the kidney for certain operations, to the duodenum, and, in its upper extremities, to the beginning of the transverse colon. On the left side, No. 11, a shorter incision, gives access to kidney, spleen, tail of pancreas, and the splenic flexure of the colon. Langenbuch's is an excellent incision as regards freedom of access, all the flat muscles tend to draw it away from the rectus. As freedom of access is of prime importance in most of the operations done through this incision it cannot be given up, but it should not be forgotten that this tendency of the flat muscles to cause gaping conduces to ventral hernia, and that an incision made a little inward and separating the fibres of the recti greatly diminishes this risk. In this respect division of the *linea semilunaris* is worse than division of the *linea alba*. Muscular action helps to close the latter incision; it makes the former gape.

No. 5 is a good incision for operations on the vermiform appendix and cæcum. It has regard to the muscular fibres and aponeurosis of the external oblique, but it divides the internal oblique and transversalis. For prevention of hernia it is not such a good incision as one almost vertical, following the fibres of the internal oblique, which are here very thick; but such an incision, in case of its being necessary to prolong it upward, leads away from the disease, while the other leads towards the disease. In many cases the fibres of the internal oblique and transversalis may be separated and retracted in the wound, so that no division

is necessary. In resection of the cæcum, the incision would have to be longer than that shown. This incision would not be good for colostomy, as it leaves the sharp edge of the oblique aponeurosis, and divides the muscles which act as sphincters. If the oblique and transversalis were teased apart, and the edge of the aponeurosis divided, it would do very well for colostomy.

No. 6 is a bad incision as regards weakening the abdominal wall, for it divides the aponeurosis of the external oblique at its strongest part, and leaves not very strong muscular fibres behind it. No. 9, on the opposite side, a little lower down, is a better one, for it causes less divisions of the fibres of the aponeurosis, and still keeps parallel to the fibres of the internal oblique. Both incisions are made so as to be directly over some collection of fluid in either of the broad ligaments where drainage must be carried out. The sac must be stitched to the wound; and as such sacs are often friable, and do not bear stitch-tension, it is wise to seek an opening as close as possible to the surface of the collection of fluid. A vertical incision here is the worst possible.

No. 7 is the usual time-honored incision for operations on the ovaries and uterus. It is extremely doubtful if it is the best as regards prevention of hernia; in fact, it is almost certain that an incision passing between the fibres of the rectus would be better in this sense. But the rectus, as a matter of fact, is nearly always exposed, and no muscular fibres being divided, the risks of hernia are here not great. As a shorter incision through the linea alba suffices than through fibres, so the harm done is probably not great.

No. 8 is for operations on the bladder, and in its lower portion for division of the symphysis. Here it is not easy to separate the fibres of the rectus, and in operations, such as resection or suture, involving very delicate manipulations, it may be necessary to divide the rectus. This is best done close to the bone; a piece of bone may well be removed with the muscle, and wired in place after operation. Where this is done, an incision of this shape  may be performed, the skin flap being turned downward, and the muscle raised upward.

No. 10 is a useful incision for certain operations on the descending and sigmoid colon. It may be short; for, dividing the external oblique where it is becoming aponeurotic, it gapes; by separating the parallel fibres of the internal oblique and retract-

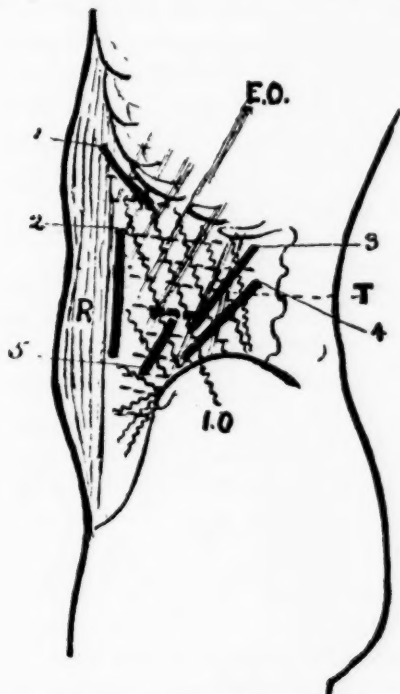


FIG. 2.—Diagram to show positions of incisions, and their relation to muscular fibres on left lateral abdominal wall.

- E. O. External oblique muscle.
- I. O. Internal oblique muscle.
- T. Transversalis muscle.
- 1. Incision for gastrotomy.
- 2. Langenbuch's incision through left linea semilunaris.
- 3. For nephropexy; nephrotomy, etc.
- 4. For left lumbocolostomy.
- 5. For laparocolostomy.

ing those of the transversalis, an excellent sphincteric action may be secured. This would be specially valuable in patients with thin parietes. This following of the fibres of the internal oblique will, by going behind the anterior superior spine, give an almost

vertical incision. In stout patients, where it may be wise to keep nearer to the middle line, such an incision as No. 5, in the lateral view (Fig. 2), would be preferable.

Incisions 11 and 12 have already been referred to.

In Fig. 2 a lateral view of the left side of the abdomen is given. Incision No. 1, for gastrostomy, is the same as No. 12 in Fig. 1. It divides fibres of the oblique and transversalis muscles, and, if the rectus is broad, some of its fibres as well. In one method of operating, the outer fibres of the rectus, separated,

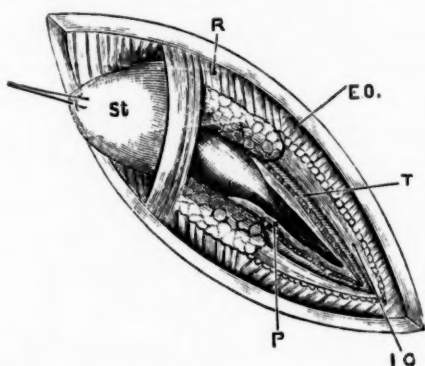


FIG. 3.—Drawing (life-size) of the incision for gastrostomy (No. 1, Fig. 2; No. 12, Fig. 1).

- R. Rectus muscle.
- E. O. External oblique muscle.
- I. O. Internal oblique muscle.
- T. Transversalis muscle.

The lines leading to the letters are in the direction of the muscular fibres.

- P. Peritoneum.

St. Stomach drawn through separated fibres of rectus muscle.

are made to surround and grasp the stomach wall drawn through the gap (Fig. 3). Rarely only rectus is divided; this is when the muscle is very broad; not infrequently the rectus is not seen at all; this is when it is narrow.

No. 2, the Langenbuch incision, has already been described (Nos. 4 and 11 in Fig. 1).

No. 5 is a good incision for laparocolostomy. It follows the fibres of the external oblique; and, as it passes diagonally

through those of the internal oblique and transversalis, a small division of the fibres of these muscles, with retraction, or retraction without division at all (which is best), will provide a useful sphincteric action around the gut in the formation of artificial anus. If the aponeurosis comes far back it ought to be notched, for it is liable to close in on the gut and narrow the anal orifice. An almost vertical incision, leaving intact the fibres of the internal oblique, is, perhaps, equally good for colostomy. It is not quite so convenient in operating, and I have thought the retraction of the divided oblique aponeurosis permits more ectropion of the mucous membrane of the gut. But this is a small matter.

Nos. 3 and 4, for retroperitoneal operations on the kidney and descending colon, have no regard to direction of muscular fibres, but are planned simply to provide facility of access. The most is made of the limited costo-iliac space. No. 3, for renal operations, goes as close up as is safe to the last rib, and as far back at the top as is convenient to avoid the thick muscles of the loin. It may divide a few fibres of the quadratus lumborum. If this incision has to be enlarged, it is best done by one running transversely across the abdomen from the lower extremity of the first incision (shown in interrupted line, Fig. 2). Such an incision divides both obliques, but leaves the transversalis.

No. 4 is the usual incision for lumbocolostomy. It has regard simply to facility of direct access to the colon, and is determined by this and the position of iliac crest. Muscles are ignored; there is little tendency to hernia here.

Many other points might be dwelt upon in relation to each incision. But, perhaps, these remarks will suffice to indicate the application of the principles enunciated.

No regard whatever has been paid to the division of vessels. With the exception of the deep epigastric, there is no vessel to be encountered whose division need give us a moment's anxiety or even consideration. Forcipressure suffices for all save the deep epigastric, which requires ligature. Small muscular branches in the lumbar operations may be numerous, but rarely require ligation.

THE MAKING OF THE INCISION.

As to the making of the incision in the situation selected certain routine procedures may be described; but the skilful surgeon will adopt a separate method for every case.

The first incision divides the skin and superficial fascia with its varying amount of fat. This, according to the position selected, will expose either dense fascial structures, as in the *linea alba*, the *linea semilunaris*, or occasionally the *fascia lumborum*, or strong fibrous aponeurosis, as that of the external oblique muscle; or the thin fascia that covers muscles away from the strong aponeuroses, or any combination of these.

In the *linea alba*, unless the abdominal walls are distended and the recti separated, one or other of the rectal sheaths is entered, and the fascial line, accurately speaking, is not divided at all. There is no harm in this. Indeed, I think exposure of the bare fibres of one of the muscles has, on grounds described above, several advantages. This thick, fibrous layer is now divided with scalpel or scissors for the whole length of the cutaneous incision. Below the fold of Douglas there is now nothing to divide but subperitoneal fatty tissue and peritoneum. The left forefinger is moved from top to bottom of the wound, a little of the fat pushed on one side, and the peritoneum caught by catch-forceps and pulled out. The peritoneum is now pulled forward out of the wound, another forceps is placed close to the first, and the sharp raised fold of peritoneum is sawed through by a scalpel. The smallest cut permits the air to rush in, and the bowels at once fall back. The opening is made large enough to admit the forefinger, and the peritoneum is then divided from end to end of the wound by scissors guided by the finger.

A glance at the divided peritoneum will show at once whether there is any bleeding which requires forcipressure. Every visible bleeding point has a forceps placed on it. Hæmostasis will be complete in a few minutes, during which the forceps are left hanging over the parietes.

If the incision is made in the *linea alba* above Douglas's fold or above the umbilicus, and if, as is usual, one or other sheath of rectus is entered, we have to divide the united aponeuroses of the

internal oblique and transversalis before reaching the subperitoneal fat. As to whether the umbilicus should be traversed or not in incision going above and below it, opinions are divided. On the whole, I think it is best to avoid it: by passing to the left of the umbilicus we avoid the round ligament of the liver; we introduce no necessity for complicated suturing; and we continue to have the advantage of exposed rectal muscle in the wound.

An incision in the linea semilunaris is surgically almost the same as in the linea alba. Here, however, the incision should fall to the inside of the fascial line, because thus we minimize the weakening of the parietes which follows. If the fascia is accurately divided, a narrow and not easily organized line of cicatrix is all that is left to counteract the tendency to gaping, which the united action of the flat muscles induces. If the sheath is entered by division of the anterior layer of united aponeuroses, the muscular fibres pushed inward, and the posterior aponeurosis divided opposite the line of the anterior, we get, if subsequent suturing is properly carried out, a broad, concavo-convex apposition of surfaces, which is more fully able to bear subsequent strain.

Incisions made away from superficial aponeurosis are chiefly in the upper and lateral regions of the abdomen. Whenever such an incision is made, the lines of direction of the bundles of at least two of the flat muscles or their fascia must be divided either transversely or diagonally. Such division, if essential, should always be as limited as possible. Often in parietes which are not very muscular it is possible to enter the abdomen without dividing any of the fibres. By separation with the forefinger and retraction of the separated bundles sufficient space is given for many purposes. In colostomy, the attempt to enter without division of muscular fibres should always be made; at least the fibres of one of the muscles should be left intact. It is always easy enough to separate the fibres with the forefinger if the division between two leading bundles is selected. In operations for appendicitis the same rule should be observed. Bleeding is very slight or absent.

CLOSING THE PARIETAL INCISION.

A great deal of attention has recently been paid to the closing of the parietal incision. The methods described are almost as varied as the descriptions. Primary healing is easily and almost universally secured by any method. Stitch abscesses result from filth, and are avoidable. The variety of method, therefore, arises chiefly from a desire to avoid the subsequent occurrence of ventral hernia. I have already argued that the occurrence of ventral hernia depends more on the way in which the incision is made than on the way in which it is sutured; and as regards the best work of the best surgeons this is certainly true. There are only a few good methods of closing the wound; there is an endless variety of bad methods in making it.

Three leading principles may be selected for our guidance in the closing of a parietal incision,—

I. *The Apposition of Raw Surfaces should be as Broad as Possible.*—The tensile power of a given surface of growing cicatrix may be taken as identical for every wound. The aggregate tensile power is increased in direct ratio to the surface involved,—in other words, the whole binding power is greater the deeper the wound. This should lead us to be careful of drawing in or narrowing the wound surface. Where the parietes are very thin, as at the umbilicus, a deliberate outfolding of skin and peritoneum, so as to give a flange-stitch, should be made. Where the parietes are moderately thin, a judicious manipulation of the needle will bring much of the muscle and deeper tissues into the wound, and cause eversion of skin and of peritoneum when the suture is tightened.

II. *Each divided Structure should be placed and kept Opposite its Fellow.*—Thus fat should lie in contact with fat, fascia with fascia, muscle with muscle, and peritoneum with peritoneum. The wisdom of this practice is self-evident; but its importance has, I think, been exaggerated. If there were one variety of cicatricial tissue for muscle, and another for fascia, and another for areolar tissue, the accurate union of each layer would be essential. But as the young tissue is the same for all, and as each layer will certainly appropriate its own bundle of fibres from the

common stock, little harm can be done if apposition is not accurate. I look upon the separate suturing of each parietal layer as a refinement always, and as a superfluity usually, provided that the single-group suture is properly placed. Sometimes it may be necessary to carry out separate suturing, in part at least; this would arise most frequently in the upper abdomen where the parietes are very thin and muscular fibres have been divided.

One objection to the suture of the separate layers is that it devascularizes the lines of union and narrows them. Such a

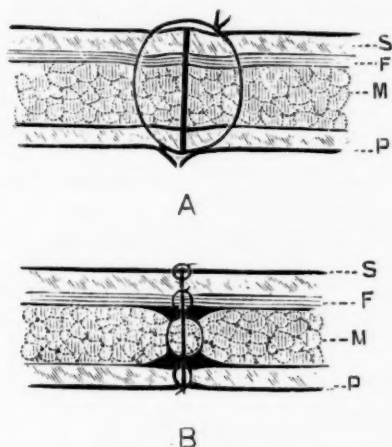


FIG. 4.—Transverse section of sutured parietal wound.

- A. Interrupted mass-suture.
- B. Continuous separate suture.
- S. Skin and subcutaneous tissue.
- F. Fascia.
- M. Muscle.
- P. Peritoneum.

suture leaves a series of gaps to be filled with clot, between each layer at the line of junction (see Fig. 4, B), there is not one flush meeting of the whole of the raw surfaces as in the mass-suture. Also the cicatricial tissue dipping into these hollows is longer, therefore more easily stretch; while the bulk of it in depth not being so great it is not so strong.

III. *The Sutures should not be removed early.*—We are all too fond of removing the sutures early. "Sutures removed on

the seventh day" is often quoted as a proof of easy and quick convalescence. Early removal of sutures is, I think, a mistake. The good that has undoubtedly followed the employment of buried sutures must arise, it seems to me, chiefly from the fact that we cannot remove them at the end of a week; they continue to maintain apposition for three or four weeks, or even longer.

At the end of a week the uniting medium is very easily stretched; and it is by no means strong at the end of a fortnight. A very little stretching then means a great increase of the potentiality of being stretched later. If the parts are kept together firmly for three weeks or a month, we have done the best that we can do to prevent stretching of the cicatrix.

In the actual carrying out of these principles, a suture that is non-absorbent, and will not act as a capillary drain upward or downward, is essential. For this purpose Bantock's silkworm gut stands unrivalled. It is scarcely possible to keep a row of silk sutures in an abdominal wound for three weeks without getting suppuration. Metal wire has no advantage over silkworm gut, and has several disadvantages. The only drawback to silkworm gut is that it is liable at the end of three weeks to become completely buried. If the ends are kept long and occasionally pulled upon, this drawback is easily averted.

For the placing of the sutures, a long, curved needle with a handle is the best. It must be long if it is to include both sides of the wound. It must be curved if it is to pick up a large bundle of muscular fibre and go in and come out near the margins of the wound. And such a needle cannot be manipulated deftly if it has not a handle. A long curved Hagedorn needle of different sizes set in a line with the handle is what I use and prefer to every other.

As to the actual suturing, a few words may not be amiss. Firstly, as to mass-sutures, they are placed from two to four to the inch, according to the thickness and position of the wound. A sponge laid between the wound and the bowels keeps them out of the way and absorbs the few drops of blood that escape through the punctures. The needle is inserted into the skin near to the edge of the incision; it is then made to pass outward into

the areolar tissue ; it takes a good hold of any fibrous layer that overlies the muscle, then it plunges deeply into the muscle and is brought out below it. Finally, it hooks up any deep fascia and picks up fibrous tissue underlying the peritoneum. *It does not pierce the peritoneum.* The needle is carried through on the opposite side in the same way in reverse order, then it is threaded and withdrawn. With a little practice with this needle the sutures may be placed with great rapidity. The depth of union sought

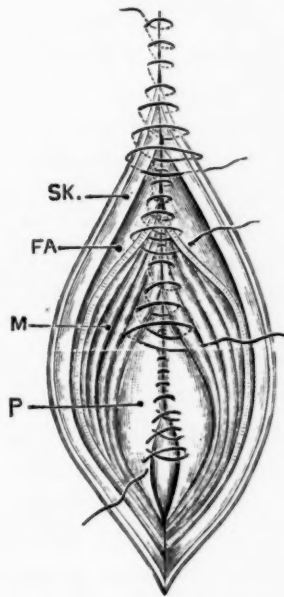


FIG. 5.—Application of continuous sutures to separate layers in closing of median abdominal incision.

Sk. Skin.
Fa. Fascia.
M. Muscle.
P. Peritoneum.

may be regulated by the amount of areolar and muscular tissue included in the deep tissues.

When the sutures are placed, the ends are gathered together in the two hands of the assistant, and the sponge removed while he pulls them forward, and so brings the wound together. Then

they are tied. The appearance in transverse section of a wound sutured in this way is shown in Fig. 4, A.

If buried sutures are used they are usually continuous, and they are made to include the individual layers. In Fig. 5 suture of all the layers is shown, the sutures being somewhat crowded. Catgut, carefully prepared, or ox-aorta, or kangaroo-tendon may be used. I have often used silkworm gut as a buried suture, and found it gave no trouble afterwards. An ordinary Hagedorn needle with holder does well for the placing of the continuous suture.

In transverse section (Fig. 4, B) the effect of this method of suturing is shown. The muscular edge is compressed instead of broadened, and gaps are left above and below, which shelter blood-clot. A good grip of fascia should be taken so as to bring into apposition folded surfaces, and not merely cut edges.

As germane to the subject, and as involving the principles discussed, short descriptions of operations for ventral hernia and for umbilical hernia may here be given.

OPERATION FOR VENTRAL HERNIA.

Ventral hernia, so-called, is simply a stretching of scar tissue, which permits the abdominal contents to escape through the parietes, and to bulge outwardly under the skin. There is no narrow neck, as in umbilical hernia, and no dissection of skin from parietes by burrowing omentum or intestine, as in umbilical hernia. The hernial sac is simply stretched peritoneum, the coverings are stretched cicatricial tissue with a little fat and stretched skin (Fig. 6).

To cure this condition, it is necessary to remove or push aside the redundant and attenuated tissues; and bring into contact, and keep in contact, the thick and non-yielding parietes.

To do this satisfactorily, it is rarely necessary to enter the abdominal cavity. The areolar tissue between the skin and the peritoneum is entered by a small incision along the chief diameter of the hernia, and then, with finger or blunt director, helped occasionally by cutting; they are completely separated down to the

margins of the wound. Any great superfluity of skin is removed, but surprisingly large flaps may be left; and if they are turned outward and united by raw surfaces, add to the strength of the union. The peritoneal sac is turned in towards the abdomen. If very abundant, it may be gathered together by a continuous purse-string suture carried through the areolar tissue, when it

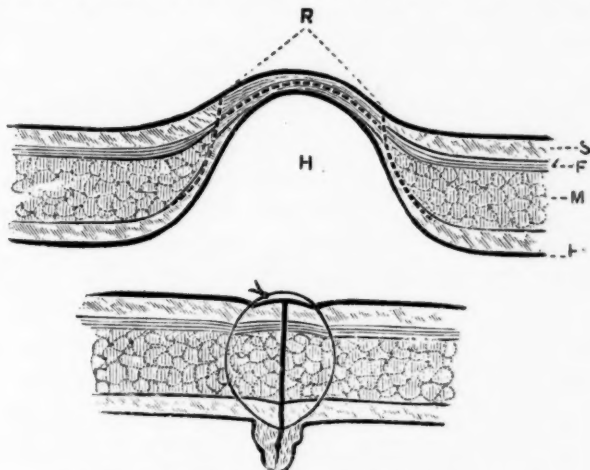


FIG. 6.—Ventral hernia and method of operative cure.

The upper figure shows in transverse section the parietes involved and the lines of incision (dotted).

- H. Placed in the hernial pouch.
- R. Skin between dotted lines to be removed.
- S. Skin.
- F. Fascia.
- M. Muscle.
- P. Peritoneum.

The lower figure shows the wound after closure. Redundant skin has been removed.

The inturned peritoneum is shown as a pendulous fold hanging downward.

will form a useful pad or buffer between intestines and incision. If not very voluminous, this peritoneal sac may be gathered in with the suture which closes the parietal incision, care being taken that each stitch takes in only areolar tissue, and that no part of the peritoneal sac is pulled between the joined parietes (Fig. 6).

The incision along the margins of the opening in the parietes is carried deeply into the tissues so as to expose the muscles. If it is difficult to bring muscle through this incision, so as to form a flange-stitch, then all cicatricial tissue should be cut clean off so as to lay bare the muscle. The parietal incision is now closed by mass-sutures, which pass well back through the subcutaneous areolar tissue, take up a good bundle of muscle and a pinch of subperitoneal areolar tissue. If an abundance of muscle is forthcoming, fasciæ may be ignored. But if, as is too often the case, especially after an incision in the lower lateral parietes, which has severed the muscles and the fascia, there is little muscle near, then we must seek out and isolate the fascia of the external oblique, and bring it over the wound somehow, even if it is necessary to resect and turn over a flap. But muscle, being the best guard against hernia, should, if at all possible, be brought into the wound. It may be possible to detach a few bundles of muscular fibre; and this should be done rather than leave the wound closed away from the immediate neighborhood of muscle.

If there is much tension, the sutures should be placed very closely; and in any case they should not be removed for three weeks or a month.

This operation is a comparatively trifling one. As it does not open the abdomen, there is none of the thirst and other sequelæ, not to mention risk, that follow exposure of the abdominal cavity.

RADICAL CURE OF UMBILICAL HERNIA.

Here we have to deal not merely with a distended peritoneo-cutaneous sac, but with the firm, round, umbilical opening with its inner ring of dense fibrous tissue; and an operation must deal with both conditions. It is sometimes possible to deal with both in the same incision and by the same set of sutures; more frequently, however, it will be advisable to deal with each separately with separate suturing.

The operation may be described in stages.

(1) Lay open cutaneous coverings of the hernia from top to bottom. An entrance is made by a small incision over the

thinnest part which overlies bowel. At such a point skin and peritoneum may lie in very close contact, and then the opening is best made by pinching up a fold and cutting it through as in entering the peritoneum. Then with scissors, guided by forefinger, divide the tissues up to the limits of the hernia. Omental adhesions may be avoided. As most of the superfluous cutaneous tissue will be removed, it does not matter if the line of division is not straight.

(2) Return the bowel into the cavity, and place a sponge between it and the umbilical opening. If the bowel is not adherent, this is done easily enough. If there are adhesions, these are separated either by simple peeling or by ligation and cutting, as seems best. Adhesions on the bowel are dealt with as if they are not to be seen again; forcipressure, therefore, is not employed on the bowel. The bowel being returned, we have done with it; the sponge in the cavity keeps it out of the way.

(3) Deal with omentum. In most cases the omentum is adherent at many points in the sac where it has opened up the subcutaneous areolar tissues, and also to overlying peritoneum. In nearly all the omentum will have increased in size in the sac. The best plan, then, will be at once to ligate and divide the omentum at the narrowed neck or pedicle where it passes through the umbilicus; return the stump into the abdomen, and remove the extruded omentum with the peritoneal hernial sac. The peritoneal membrane will have to be removed either bodily or by peeling; it is superfluous first to remove adherent omentum, then to remove the tissues to which the omentum is adherent; it is more workman-like to remove both together.

In ligating the omental pedicle, a double transfixing and interlocking ligature of silk should be employed, and compression should be aided by pinching the line of ligature with a strong forceps. This does away with the risk of hæmorrhage from slipping of the tissues away from the ligature. The omental stump on division is pushed inside the abdomen behind the sponge, and the cavity is now permanently excluded from the field of operation.

(4) Remove superfluous skin and sac. The distal side of

the stump, with forceps attached, is now pulled out of the wound, and the sac is thereby everted and all adhesions and attachments made visible. The amount of skin to be removed is now decided upon, and the division is at once made by clean sweeps with the

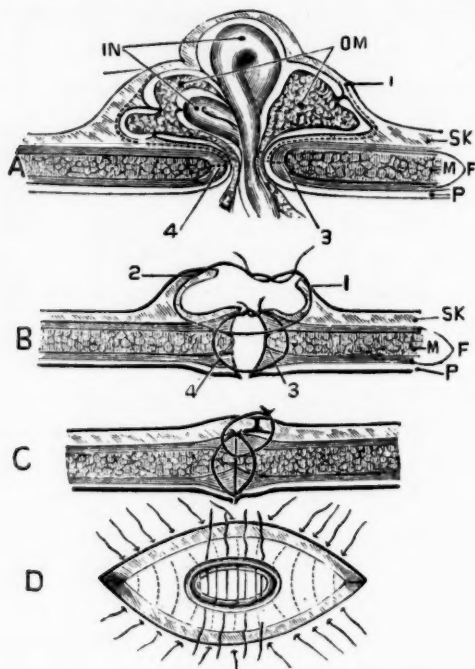


FIG. 7.—Radical cure of umbilical hernia.

- A. Transverse section through hernia; IN, intestine herniated; OM, omentum in sac, hypertrophied and adherent; Sk, skin; F, fascia; P, peritoneum; 1 and 2, placed at the points where superfluous skin and sac are removed on the outer aspect, and where sac is detached and removed on the inner; 3 and 4, incisions down to recti through fascial surrounding of ring. The dotted lines between 1 and 3 and 2 and 4 mark the line of separation of sac.
- B. Same,—bowel returned, omentum and sac removed; superfluous tissue removed; structures around ring opened up (3 and 4) and sutures inserted. References as in A.
- C. Suturing completed.
- D. Bird's-eye view (on diminished scale) of wound area with sutures inserted ready for tying. (Part of one of the umbilical sutures is by mistake omitted.)

scissors. This, in many cases, will let free the omentum as well. Adhesions in some cases are found in the deeper portions of the sac; by dragging on the omentum and using the finger or blunt dissector the sac is separated from surrounding areolar tissues down to the circumference of the umbilical opening and then bodily cut off with the adherent and herniated omentum. It is useless to waste time in separating sac from skin where both are to be cut away; separation is begun only after superfluous tissues are removed. The peritoneal covering is now stripped off all around the umbilical opening and pushed inside the abdomen.

(5) Open up the free margin of the umbilical ring so as to liberate the edges of the recti. In harmony with the principles already contended for, this is the most important single element in the operation. A deep cut (with a knife with bent blade, if necessary) is made into the dense fibrous tissue which surrounds the ring, completely dividing it down to the muscle. The muscle will either at once spring into the opening or will come after a little coaxing. This finishes the cutting part of the operation.

(6) Insert the sutures. For most cases it is advisable to use a double row of sutures: one deep and dealing with the umbilical opening; the other half deep and superficial, dealing with the cutaneous and outer fascial tissues. Silkworm gut is probably best for both. The deep sutures are inserted, first, through the outer edge of the divided dense fascia; then deeply into the muscle; then through the inner edge of fascia; and then through the subperitoneal fibrous tissue and carried through the opposite side in reverse order (Fig. 7, B, 3, 4). From four to six interrupted sutures will be required, according to the size of the opening. When they are inserted, the sponge is removed from the abdominal cavity and they are then tied and the ends cut short. Then the cutaneous tissues are brought together. It is well, if possible, to bring out-lying areolar tissue into the wound, and to bury the outer suture completely. The sutures pass a little way into the deep tissues between the deep sutures so as to help them (Fig. 7, B, C, D), and one placed in half radiating

fashion from the umbilicus so as to bring the whole outer wound into the smallest possible compass.

Occasionally one set of sutures may, with propriety, be made to serve, and I have had several successful cases done this way. But the sutures are placed with more accuracy and ease in a double row, and probably they give greater security.

The operation thus concluded is dressed in the ordinary way. The outer stitches may, with advantage, be left in for a fortnight or three weeks.

THE OPERATIVE TREATMENT OF HERNIA, WITH A REPORT OF TWO HUNDRED CASES.¹

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THE profession at large is by no means agreed upon two very important points,—(1) As to what method or methods of operation for the radical cure of hernia are the best; (2) as to the permanent value of all methods of operation.

These are questions of vital interest both to the physician and surgeon, and any new evidence that may help to decide them should be welcomed.

The number of different operations that have been proposed during the past twenty years is very large, and yet, when we come to analyze them, most of them are founded upon a few main principles that date back almost to the time of Celsus.

We might suppose that the value of an operation so old could easily have been determined long ago. The question was settled in the early centuries of the Christian era, reopened in the Middle Ages, and again, in accord with the almost unanimous judgment of the masters in surgery, all operations were abandoned and forgotten.

With the discovery and application of the principles of antiseptics, surgeons were not slow to perceive that the question must be tested again, *de novo*, with the possibility that under new conditions the earlier verdict might be reversed. Since that time the operative treatment of hernia has been on trial, the leading sur-

¹ Read before the New York Surgical Society, January 23, 1895.

geons of the world have been its advocates, and the profession at large are quietly awaiting the decision.

It is not my purpose to review the whole subject of the "radical cure" of hernia, but rather to contribute a brief clinical report based upon personal experience in 200 cases operated upon during the past three and a half years.

These cases vary in age from five months to sixty-two years. A large majority of the cases (138) have been in children under fourteen years of age, and, as I have very recently read a paper on "Operative Treatment of Hernia in Children," before the College of Physicians of Philadelphia, I shall only refer to the results in children in a general way.

Analyzing the cases as a whole, we have—

12 cases of femoral hernia.

5 cases of umbilical hernia.

3 cases of ventral hernia.

180 cases of inguinal hernia (17 in females, 163 in males).

Methods of Operation and Technique.—(a) Ligature of the sac and suture of canal, without transplanting the cord, was employed in fifteen cases. The immediate and final results in these cases were as follows: In two cases the buried sutures were of simple non-chromicized catgut; of these, one relapsed in four months, the other is well three years after operation.

(b) In one case silk was used for the buried sutures, and although the case healed by primary union soon after leaving the hospital, two small sinuses appeared in the cicatrix, and refused to heal until the silk sutures had been extruded. Relapse occurred in this case in three months in spite of constant support of a truss. A second operation was performed for the recurrence, this time by Bassini's method, and although no truss has been worn since, the patient is now perfectly well, two years and six months later.

(c) *Chromicized Catgut.*—This was used in seven cases; of these, two are sound three and a half years after operation; one is sound three and a quarter years after operation; three others are sound two years and ten months after operation; one is sound two years and eleven months after operation.

(d) *Kangaroo Tendon*.—This was employed in four cases;¹ of these, one is sound two years and five months after; a second, two years and six months after; a third, eight months after; and the fourth was not traced.

Bassini's method, with the substitution of kangaroo tendon for silk in the buried sutures, was employed in 160 of the remaining 165 cases of inguinal hernia.

Bassini's method with other than kangaroo tendon for suture material was employed in five other cases; silk was used in two of them, and chromicized catgut in the other three. Suppuration, either early or late, occurred in four of these cases.

In one, my first Bassini operation in children, the suppuration was profuse and prolonged, all the sutures sloughing out. Relapse occurred within three months. Silk was used.

The second case, in which silk was used, although moderate suppuration occurred, none of the sutures were extruded, and the patient remains well three and a half years after operation.

Of the three cases in which chromicized catgut was used, one had slight superficial suppuration, and is well more than three years after operation; a second is well three years after; the third is a recent case, and although the wound healed by primary union, two small sinuses appeared at site of cicatrix some days after the patient was up and about the hospital.

No sutures came out, but the sinuses persisted for several weeks, and necessitated the patient's remaining in the hospital.

There are now remaining for consideration 160 cases of inguinal hernia not only operated upon by a single method, but in which the same technique in every detail was carried out. An analysis of a large series of cases operated upon under the same conditions furnishes much more satisfactory data for conclusions than when a number of methods have been employed.

Primary Results.—Of these 160 cases only one death has occurred (the only one in the entire series), due to a double pneumonia on the eighth day, without wound or abdominal complications, as proved by autopsy.

Suppuration occurred in but seven cases, giving 95.5 per

¹ When cord was not transplanted.

cent. of primary union. In all of these cases, with one exception, the suppuration was superficial and of little moment. Of the 138 cases in children, primary union occurred in 96 per cent. Slight temporary orchitis was observed in a few cases, particularly when the hernia had been of the congenital type and the testis had been subjected to more or less manipulation during the operation.

Final Results.—A truss has not been advised after operation except in two or three instances, where the patient was stout and had long been accustomed to a truss.

Of the 160 operations by the Bassini method, with kangaroo tendon for the buried sutures, not a *single* relapse has occurred, and all of the cases except six have been traced.

Two cases operated upon by Bassini's method have gone without relapse 3 to 2½ years.

10	.....	2½ to 3 years.
18	.....	2 to 2½ "
25	.....	1½ to 2 "
21	.....	1 to 1½ "

Making seventy-six more than one year. All but five were traced to final results. One case died one year after operation from another trouble, two other cases died of troubles not connected with the hernia, after leaving the hospital.

Femoral Hernia.—Of the twelve cases, all were operated upon by the method of high ligature of sac and suture of the crural canal either with chromicized catgut or kangaroo tendon. All of the cases healed by primary union. Seven of the cases were adults and five children. Two of the cases have not been traced, the remaining ten are at present sound without recurrence.

Of the five cases in children—

One is well 2 years and 10 months after operation.				
One	"	1 year	10	" " "
One	"	1 "	8	" " "
One	"	1 "	6	" " "
One " " 4 months (a recent case) after operation.				

Of the seven adults

One is sound 2 years and 4 months after operation.	
One is sound 1 year and 7 months after operation.	

Three were recent cases operated upon in October and November, 1894, and January, 1895. One was strangulated, and all are sound at the present time. None of the cases have worn a truss. Two cases have not been traced.

Umbilical and Ventral.—Eight cases, four of these occurred in children and four in adults. Of the children, one aged eight years is without relapse one year and six months after operation; one, a congenital "hernia of cord," the size of a goose-egg, operated upon in November, 1893, had a slight bulging within a few weeks after the operation, due to a bad cough and probable cutting through of sutures. The third case is at present, seven months after operation, perfectly sound; the fourth has not been traced. No support has been worn after operation except in the case with bulging. Of the four adult cases all were operated upon within the past seven months.

One case, a long-standing, irreducible, and frequently incarcerated ventral hernia in a woman, sixty-two years of age, is well seven months after operation. The hernia was situated midway between umbilicus and symphysis pubes and was about the size of the closed fist. A large mass of omentum, almost as hard as cartilage from frequent attacks of inflammation, was ligated with catgut and removed. The wound in this, as in all the other cases of umbilical and ventral hernia, healed perfectly by primary union without any complications.

The second case, an irreducible, adherent umbilical hernia (Case CXLVII) in a woman, aged thirty years, was operated upon August 2, 1894. She has had no relapse.¹

The third case, adherent umbilical hernia in a woman, aged thirty-five years, was operated upon in October, 1894, and the fourth, a recurrent umbilical hernia, was operated upon in January, 1895.

In the adult case, all occurring in stout women with a large amount of adipose tissue, and poorly-developed abdominal muscles, an abdominal belt has been advised after operation.

The technique of the operation that has been employed is simply excision of redundant skin (including umbilicus) and sac;

¹ Since this paper was read, a slight relapse has been observed in this case.

suture of peritoneum, fascia, and skin in three layers, using kangaroo tendon for the buried sutures and silkworm gut for the skin.

Wound Treatment.—No drainage has been employed (except in two of the early cases); moist iodoform and bichloride gauze, covered with absorbent cotton, and held in place by a firm spica bandage, has been the uniform wound treatment. A plaster-of-Paris spica to produce fixation of the hip has been used in nearly all of the children, but it has been deemed unnecessary in adults. The first dressing is usually on the eighth day, and at the end of two to two and a half weeks the patient is allowed to be up and about ward, leaving hospital at the end of three weeks.

No case of atrophy of the testes or even functional trouble of any kind has been observed following the operation, and this fact proves that the chief theoretical objection urged against Bassini's operation is without foundation.

No injury was done the vas deferens in any case, and with a moderate amount of care this can be avoided.

Strangulated Hernia.—Looking at the cases from a pathological stand-point, seven were strangulated.

In view of the fact that strangulation in infants and young children is generally regarded as too rare for consideration, it is of interest to note that five of the cases were infants under two years of age. One was five months old, one seven and a half months, one eight months, one twelve months, one twenty-three months.

I have operated upon a sixth case, aged eight weeks, but, owing to the fact that the infant was in an almost moribund condition no attempt at radical cure was made. This case did not recover, and is the only fatality in eight cases of strangulation. Of the two adult cases one was femoral and the other a sigmoid,—*cæcal hernia*. In nine cases the cæcum and appendix, one or both, were found in the hernial sac. In two cases the appendix alone was found in the sac, adherent to the wall of the sac. The adhesions were separated and the appendix returned to the abdominal cavity. In one case (strangulated) the appendix was so dark in color that it was thought best to remove it. Whether the appendix, whenever found in a hernia, ought to be removed

is an open question. Many surgeons remove it on principle. Yet, if it is perfectly healthy, as is usually the case, I do not believe one is warranted in adding to the risk of the hernia operation itself the additional risk of removing the appendix, although it may be very slight.

In six cases the hernia was associated with Pott's disease of the spine, and in two with incontinence of urine. Primary union occurred in all of these.

Summary of results of the 200 cases taken as a whole: 12 femoral, no deaths, no relapses; 8 umbilical and ventral, no deaths, one slight relapse; 180 inguinal herniæ, one death, three relapses; 160 inguinal herniæ, Bassini's method, with kangaroo tendon for buried suture, not a single relapse. All the cases with the exception of ten have been *traced*. Of these, seven were inguinal, two femoral, one umbilical.

As to the question of the permanency of cure after operation, it is most important to know what period of time should elapse before we can speak of the probability of a permanent cure. To throw some light on this most important point, I have analyzed 250 cases of relapsed hernia, carefully recorded at the Hospital for Ruptured and Crippled.

This analysis shows that in 65 per cent. of these cases the relapse occurred during the first six months after operation, and in 85 per cent. during the first year, leaving but 15 per cent. that occurred after the first year. These figures were found to be almost exactly the same in the strangulated as the non-strangulated. From this we can conclude that, while relapse may occur (in some cases it did occur as late as twenty years) at any time after operation, if one year has elapsed without recurrence, the chances are very good that it will remain sound.

As to *choice of operation*. As most of the cases here reported were operated upon by Bassini's method, I am not in a position to speak from personal experience of the other methods of operation in vogue. I believe that with the substitution of an absorbable suture,—*e. g.*, kangaroo tendon for silk for the buried sutures,—the Bassini operation is the best of any of the operations that we know of at present. The results by this method in 160

cases without a single relapse are superior to Bassini's own results. I believe the choice of suture material of the greatest importance in any operation for hernia, and, as I have already stated in a recent paper on hernia in children, I believe that silk, silkworm gut, and silver wire should all be discarded. No matter how aseptic the suture or the field of operation, these sutures are foreign bodies, and if left as near the surface as they must be in a hernia operation, there is a tendency on the part of the tissues to throw them off, and not infrequently, after an apparent primary union, sinuses subsequently appear and fail to close until the sutures have been extruded. This is not a theoretical objection merely, but based upon actual experience derived from observation of a considerable number of such cases at the Hospital for Ruptured and Crippled during the past four and a half years. A glance at the records of a few of these cases may be of interest.

CASE I.—Male, aged fifty years. Operation December 20, 1893. Silk used for buried sutures. There remained an unhealed sinus the following March. Three silk sutures had come out at different times, and on opening up the sinus two more were removed by the surgeon. Relapse occurred four months after operation.

CASE II.—Male, aged thirty-nine years. Operation May 15, 1891. Silkworm gut used for buried sutures. Sinus followed, and was two months in healing, several sutures having come out in the mean time. Relapse in this case occurred in a few months.

CASE III.—Male, aged twenty-seven years. Reducible inguinal hernia. Modified Macewen operation, silver wire being used for the buried sutures. The patient was seven weeks in the hospital, and two months later there remained an unhealed sinus discharging pus. The sinus had to be opened up and the offending sutures removed before healing took place. Relapse occurred a few months later.

A fourth case was even worse than any that have been mentioned. In this case the sinuses remained for nearly a year, during which time the patient was practically an invalid. Others could be narrated, but these are sufficient to prove the force of the objection. They were all operated upon by the best surgeons of this city, men whose reputation for careful aseptic work is a sufficient guarantee that the results were not due to faulty technique.

Most surgeons at the present time admit that perfect *primary union* is one of the most important factors in securing lasting results. Granting this, it follows that all forms of buried sutures that seriously interfere with primary union ought to be given up unless they possess some greater advantages to offset the objections that have been urged against them.

I know that many will say that silk, silkworm gut, and silver wire can all be buried without causing further trouble. I admit this to be true in a certain and, perhaps, the larger proportion of cases, but that they do cause trouble in a considerable number of cases is a fact beyond dispute. We have only to compare the results of men who use these sutures with those who use an absorbable suture to be convinced.

Sir William MacCormac, in his Bradshaw lecture of 1893, has analyzed the cases of the leading surgeons as to the proportion of cases followed by "immediate healing of the wound."

In Billroth's cases (silk used) there was primary union in 39 per cent.

In Schede's cases (silver wire) there was primary union in 35 per cent.

In Macewen cases (chromicized catgut) there was primary union in 86.7 per cent.

In Halsted's cases (silk) there was primary union in 82 per cent.

At the Johns Hopkins Hospital, where the refinements of aseptic technique probably equal or surpass anything that can be found in the hospitals of this country, at least, Dr. Halsted states they have given up the use of silk for the very reasons I have mentioned. It is true, silver wire has been substituted for silk, which is open to the same objections.

The tendon suture has been shown by actual experiment (Ballance and Edmunds's Ligature of Arteries in Continuity) to be capable of absorption in about three months, or almost exactly the time required for perfect tendinous union.

Whether the transplanting of the cord is to be regarded as essential to the highest degree of success in hernia operations it is hardly possible to state positively. It may be that the high

ligation of the sac, and the perfect closure of the canal, made possible by slitting up aponeurosis, has quite as much to do with the good results as transplanting the cord. My own cases, operated upon by this method without transplanting the cord, but using the same sutures, kangaroo tendon and chromicized catgut, have none of them relapsed, and some have gone more than three years. One was a very large double hernia (the size of an orange) operated upon in April, 1892. The boy is perfectly sound at present, nearly three years later; and another very large strangulated sigmoid hernia is well, three and a quarter years after operation. It is true, the number of cases operated upon by this method is too small to compare them with the cases operated upon by Bassini's method, or to draw absolute conclusions.

In comparing Bassini's method with Halsted's, which resembles it in the main, features,—viz., high ligation of the sac and transplantation of the cord,—there remain two important points of difference.

In the Halsted operation nearly all of the veins are ligated. That this is unnecessary, except when the veins are in a varicose condition, the results of Bassini and others prove. The other point of difference is placing the cord external to the aponeurosis of the external oblique, covered by skin only instead of beneath the aponeurosis. It is easy to point one objection to having the cord so superficial, but waiving objections, some advantages in having the cord thus placed should be brought forward. Such advantages have not been made clear.

On the other hand, when the wound has been closed by the Bassini method, the only weak point where the hernia is liable to recur is at the new internal ring or place where the cord emerges. The same weak place exists in the Halsted operation as well. In the Bassini, if a protrusion should begin, its further progress is resisted by the strong aponeurosis of the external oblique, through which it must force its way, or take a right-angled course, a distance of about two inches, until it reaches the external ring.

In Halsted's operation, when once it has started, it has only

the skin and superficial fascia to oppose it, and we know how readily these yield. The results of the operation, immediate and final, are inferior to Bassini's, and until superior results shall have been demonstrated, I believe we should continue to operate by Bassini's method. The technique is simpler, and after a little experience the operation can be performed in from fifteen to twenty minutes.

Choice of Cases.—Three years ago many surgeons doubted the wisdom of operating upon hernia in children, and, in fact, that was the opinion held at the Hospital for Ruptured and Crippled. Of eighteen cases operated upon then, in 1889 and 1890, by the Czerny and Socin method, with catgut for the buried sutures, ten relapsed, and eight of these relapses occurred within the first six months after operation. The almost perfect results obtained from Bassini's method during the past three years added to the brilliant results of Felitzet, in France, who has operated upon 105 cases, with one death and but two relapses, are sufficient evidence to prove that the period of childhood is the most favorable of all for success.

As most cases of hernia in children can be cured by mechanical treatment, operation has been advised only in cases where prolonged use of the truss has been without benefit, or in cases not satisfactorily held by a truss,—*e.g.*, cases associated with reducible hydrocele, adherent omentum, or adherent appendix. The 136 cases of children operated upon have been selected from upward of 4000 cases. Operation has been seldom advised if the patient is over fifty, unless there are strong reasons for so doing. In cases of femoral hernia operation has been advised almost at once, since cure seldom follows mechanical treatment, and the results of operative treatment are even better than in inguinal hernia. Bassini's recent statistics show fifty-four cases of femoral hernia without a single death and no relapse, in forty-one cases traced from one to nine years after operation.¹

In regard to very large ventral and umbilical herniæ, occurring as they usually do in stout women, with a very thick layer of subcutaneous fat, and a correspondingly thin layer of healthy

¹ Archiv für klin. Chirurg., 1894.

muscular tissue, we cannot hope for the same success as in inguinal and femoral hernia. These cases are usually irreducible and very adherent, and the operation cannot but be attended with considerable risk. The indication for operation in this class of cases I believe to be, first, frequent attacks of severe pain with symptoms of threatened incarceration. In such cases the operation is attended with less risk than the risk of delay, with the probability of operation for strangulation later on. Second, age; women under forty, in good health, with hernia of moderate size, should be operated upon. If these cases are allowed to go on, in a few years the operation becomes more and more dangerous, while the chances of success are correspondingly diminished. Only a word need be said of umbilical hernia in infancy and childhood. The very large proportion are cured by mechanical support. The few that fail to be cured by this treatment can be very easily and successfully treated by operation.

DETAILS OF INDIVIDUAL CASES.

Nos. 1 and 2.—W. H. S., aged twenty-nine years, laborer. Double oblique inguinal hernia of several years' duration, not satisfactorily controlled by truss. Operated upon September 5, 1891. Bassini's operation on the right side and Czerny's on the left. Chromicized catgut was used for buried sutures. Primary union on the left side, slight suppuration on the right. Drainage-tube used on the right side. Final result, perfectly sound February 15, 1895. Has worn light truss since operation.

Nos. 3 and 4.—I. W., aged twenty-four years. Double oblique inguinal hernia not controlled by a truss. Operation August 25, 1891. Bassini's operation left side, Ball's operation right. Chromicized catgut used for buried sutures. Slight suppuration on left side, primary union on the right. Five weeks in hospital. No relapse January, 1895. Has worn light truss since operation. Chromicized cat-gut used.

No. 5.—G. C., aged twenty-five years. Left oblique inguinal hernia, strangulated thirty-six hours. Operation October 22, 1891. Sac was found to contain a loop of the sigmoid flexure, together with a large mass of omentum. The bowel was greatly congested and of dark color, but on relieving the constriction and applying warm

towels, it sufficiently regained color to permit its return to the abdominal cavity. The omentum was not ligated. Wound healed by primary union, and the patient left the hospital at the end of three weeks. Final result, January 22, 1895, perfectly well.

No. 6.—R. H., aged forty-five years. Right femoral hernia, irreducible for five years. Operation December, 1891. A mass of omentum was removed, and the sac ligated high up. The crural opening was closed with a purse-string suture of chromicized catgut. The wound healed by primary union. Final result not traced.

No. 7.—F. R., male, aged twenty years. Left oblique inguinal hernia incarcerated. Operation March 7, 1892. A large mass of omentum was removed. Catgut ligatures. The pillars of the canal were closed with chromicized catgut interrupted sutures. The wound healed by primary union. Patient left the hospital at the end of two and a half weeks. Perfectly sound October, 1894.

No. 8.—J. W., male, aged twenty-five years. Right oblique inguinal hernia, reducible. Operation March 15, 1892. Bassini's operation; kangaroo-tendon sutures were used in both deep and aponeurotic layers, the skin was closed with catgut. Primary union. Two and a half weeks in hospital. Final result not traced.

No. 9.—H. K., female, aged forty years. Right femoral, irreducible, hernia. Operation March, 1892. Omentum ligated, crural canal closed. Purse-string suture, kangaroo tendon. Primary union. Final result not traced.

No. 10.—W. W., male, aged twenty-four years. Right oblique inguinal hernia, reducible. Operation April 31, 1892. Bassini's operation; kangaroo tendon. Primary union; three weeks in hospital. Final result not traced.

No. 11.—M. B., male, aged twenty-six years. Right oblique inguinal hernia, reducible. Bassini's operation April 29, 1892. Kangaroo tendon, no drainage. Primary union; fifteen days in hospital. Final result, no truss since operation. Occupation requires very heavy lifting. Perfectly sound January 18, 1895.

No. 12.—W. M., male, aged twenty-one years. Right oblique inguinal hernia. Operation August 2, 1892. Bassini's operation; kangaroo tendon, no drainage. Primary union. Final result, sound January 2, 1895.

No. 13.—J. M., male, aged twenty-two. Operation September 3, 1892. Right oblique inguinal, irreducible, cæcal. Pillars of canal sutured with kangaroo tendon, cord not transplanted. Primary union;

three weeks in hospital. Light truss temporarily. Final result, perfect January, 1895.

No. 14.—M. H., female, aged nineteen years. Left femoral. Operation October, 1892. Purse-string suture of canal, high ligation of sac, no drainage. Primary union; two weeks in hospital. No relapse January 5, 1895.

No. 15.—H. O., male, aged eight years. Right oblique inguinal hernia, congenital, size of a hen's egg, irreducible for one week. Czerny's operation December 12, 1891. Small bit of omentum was found in the sac, hydrocele of the cord present. Catgut sutures (non-chromicized) used in closing pillars of ring. Primary union. Three weeks in hospital. Final result, relapsed four months after operation.

No. 16.—C. R., male, aged thirteen years. Right oblique inguinal hernia; three years' duration; size of a fist. Not controlled by truss. Operation December 28, 1891. Bassini's operation, with deep sutures of silk; no drainage; profuse suppuration, during course of which deep sutures came out. Final result, relapse three months after operation.

No. 17.—D. M., male, aged sixteen years. Left oblique inguinal hernia, congenital; not well-controlled by truss. Operation January 25, 1892. Czerny's operation; catgut sutures; no drainage. Primary union. Three weeks in hospital. The hernia was complicated with hydrocele of the cord. Final result, perfectly sound December, 1894.

Nos. 18 and 19.—V. S., male, aged nine years. Right oblique inguinal hernia, four years' duration. Treatment with truss carefully tried during entire time without improvement. Hernia the size of an egg. Operation January, 1892. Czerny's operation, silk ligatures. Primary union. Soon after leaving the hospital a small sinus appeared from which subsequently one of the silk ligatures was discharged. The hernia relapsed three months after operation, although a truss had been worn the entire time. A second operation was performed in July, 1892, this time Bassini's. Kangaroo tendon was used for the buried sutures as well as for the aponeurosis. Primary union followed, and no truss has been worn since operation. Final result, perfectly sound January 22, 1895.

No. 20.—J. B., male, aged thirteen years. Left oblique inguinal hernia of eleven years' duration, truss treatment two years without improvement. Operation March 15, 1892. Czerny's operation; with chromicized catgut buried sutures; no drainage. Primary union.

Three weeks in hospital. Light truss worn a short time after operation, then discarded. Final result, January 2, 1895, perfectly sound, not wearing truss.

No. 21.—F. H., male, aged ten years. Left oblique inguinal hernia, congenital, complicated with hydrocele of the cord. Czerny's operation; chromicized catgut; buried sutures; no drainage. Three weeks in the hospital. Primary union. January 2, 1895, perfectly sound; no truss.

No. 22.—J. P., male, aged seven years. Right oblique inguinal hernia of three years' duration, not controlled by truss. Bassini's operation March 30, 1892. Chromicized catgut for deep sutures as well as aponeurosis; skin closed with fine catgut; no drainage. Primary union. Two and one-half weeks in hospital. A small portion of irreducible omentum was found in sac, ligated with catgut, and excised; truss worn a short time after operation. Final result, February 27, 1894, perfectly sound.

Nos. 23 and 24.—T. H., male, aged seven and one-half years. Double oblique inguinal hernia, four years' duration, very large, and not controlled by truss. Hernia on the left side the size of an orange, and on the right size of an egg. Both sides operated upon April 8, 1892. Czerny's operation; chromicized catgut; buried sutures; no drainage. Three weeks in hospital. Perfect primary union on both sides. Truss worn for a few months after operation. Final result, October 3, 1894, perfectly sound.

Nos. 25 and 26.—G. M., male, aged seven years. Right femoral hernia and left oblique inguinal. The hernia on the left side had existed three years, and was supposed to have been cured by a truss, but relapsed. The right femoral hernia was of six months' duration. Both sides were operated upon April 28, 1892. In the femoral hernia, the sac was excised high up and the crural opening closed by buried purse-string sutures of kangaroo tendon, the skin wound being closed by catgut. The inguinal hernia was operated upon by high ligation of sac and suture of canal without transplanting cord, using the buried sutures of kangaroo tendon for the pillars of the ring. Primary union was obtained on both sides, and the patient left hospital at the end of three weeks. Final result, no relapse January 22, 1895.

No. 27.—F. H., male, aged thirteen years. Right oblique inguinal hernia, eleven years' duration. Truss had been worn for seven years without improvement. The hernia was the size of a hen's egg, and

not easily controlled by a truss. Operation May 5, 1892. Bassini's method. The sac was very large and easily admitted two fingers. Kangaroo tendon was used for both deep and aponeurotic layers of sutures, skin being closed as usual with catgut, no drainage. Patient remained in bed two and a half weeks, perfect primary union followed. Final result, January 22, 1895, perfectly firm; no truss.

No. 28.—J. U., male, aged seven and a half years. Right oblique inguinal hernia of several years' duration, complications, adherent omentum. Operation June 5 1892; Bassini's method. The omentum was ligated with catgut; kangaroo tendon used for buried sutures; skin closed with catgut; primary union two and a half weeks. Final result, October 3, 1894, no relapse.

No. 29.—I. S., male, aged four and a half years. Right oblique inguinal hernia, congenital. Operation June, 1892; Bassini's method. Kangaroo tendon for buried sutures; two and a half weeks in bed; perfect primary union. Final result, October 3, 1894, perfectly sound.

No. 30.—J. F., male, aged eight months, Right oblique inguinal hernia, strangulated. The hernia had existed but one week, and had been strangulated for twenty-four hours when seen. Taxis under chloroform failed to reduce the hernia. The condition of the child was desperate, and an operation was at once performed. The hernia having been reduced, the wound was closed by the Czerny method, using kangaroo tendon for the buried sutures. Patient remained in the hospital one week; perfect primary union followed. Final result, January 22, 1895, perfectly sound, not wearing truss.

No. 31.—D. B., male, aged fourteen years. Left oblique inguinal hernia, congenital, the size of an egg, not controlled by truss. Operation July 20, 1892; Bassini's method. The lower part of the sac was sutured over the testicle with fine catgut, kangaroo tendon was used for buried sutures. Perfect primary union; three weeks in hospital; no truss worn after operation. Final result, February 27, 1894, perfectly firm; no truss.

No. 32.—T. C., male, aged ten years. Right oblique inguinal hernia, congenital and complicated with a very large reducible hydrocele, the size of a fist. Truss was worn, but, on account of the fluid, the hernia was perfectly uncontrollable. Operation July 6, 1892; Bassini's method. The lower end of sac was sutured with fine catgut over testis, and the wound closed in the usual way, buried sutures of kangaroo tendon. Patient remained in bed two weeks; perfect primary union. Final result, October 10, 1894, perfect; no truss.

No. 33.—W. M., male, aged fourteen years. Left oblique inguinal hernia, one year's duration, not controlled by truss. Operation August 23, 1892. Bassini's method; kangaroo tendon for buried sutures, no drainage. Patient remained in bed two weeks; wound healed by perfect primary union. Final result, January 22, 1895, perfectly sound; no truss.

No. 34.—M. F., male, aged twelve years. Left oblique inguinal hernia, congenital. Truss had been worn two years without improvement. Operation August 23, 1892. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. Patient remained in bed two and a half weeks. Perfect primary union. Truss was worn for a few months after operation, then discarded. Final result, February, 1894, perfectly firm; no truss.

No. 35.—W. S., male, aged four years. Large left oblique inguinal hernia, *cæcal*. The hernia was of the congenital variety and the size of a fist; a truss had been worn since the child was a few months old, but the hernia could never be properly controlled. Operation September 13, 1893. The incision was made exactly as in the Bassini operation, the sac ligated high up, the deep parts of the canal closed with buried sutures of kangaroo tendon, with separate sutures of the same material for the aponeurosis. The skin layer was closed with interrupted catgut sutures. The operation was precisely the same as the Bassini, except that the cord was not transplanted. Wound healed by primary union. Patient left the hospital at the end of three weeks. Final result not traced.

No. 36.—J. F., male, aged eleven years. Right oblique inguinal hernia of several years' duration, and not controlled by truss. Operation September 9, 1892. Bassini's method; buried sutures of kangaroo, skin sutures catgut. Duration of treatment two and a half weeks in bed; primary union. Final result, February 27, 1894, perfectly sound; no truss.

No. 37.—P. D., male, aged nine and half years. Right oblique inguinal hernia of several years' duration. Truss treatment tried, but not effective. Bassini's operation October 5, 1892. Kangaroo tendon for buried sutures; perfect primary union; two and a half weeks in bed. Final result, October 20, 1894, perfectly sound; no truss.

No. 38.—F. B., male, aged fourteen years. Left oblique inguinal hernia, congenital. The hernia was supposed to have been cured by a truss, in early childhood, but afterwards relapsed. Operation October 29, 1892. Bassini's method; kangaroo tendon for

buried sutures; no drainage; two and a half weeks in bed; perfect primary union. Final result, January 23, 1894, perfectly sound; no truss.

No. 39.—E. W., male, aged twelve years. Left oblique inguinal hernia the size of an orange, not controlled by truss. Bassini's operation November 1, 1892; kangaroo tendon for buried sutures, catgut for the skin; no drainage; primary union; two and a half weeks in bed. Final result, January 22, 1895, perfectly sound; no truss.

No. 40.—I. N. F., female, aged three and a half years. Congenital hernia of umbilical cord. The hernia was the size of a large goose-egg, and was frequently difficult to reduce, and caused much pain. It was present at birth or before the "fall of the cord," and had all the characteristics of a true congenital umbilical hernia, coming in the class designated by Macready as "hernia of the root of the cord," where the abdominal opening is of moderate size. The opening easily admitted two and nearly three fingers. Operation November, 1893 (private). The skin and sac formed one and the same layer over a part of the tumor, and this layer was so thin as to be almost transparent. The redundant portions of the sac and skin were removed, and the wound closed in separate layers, using kangaroo tendon for the buried sutures. The patient developed a severe bronchitis after the ether, and, although the wound healed by perfect primary union, a slight bulging appeared about three weeks later. This has not increased since, though she wears a slight support.

I have seen but one other case of "congenital umbilical hernia" or "hernia of the cord," and that in an infant three months old. It was about the size of a quart measure at birth, and no hope of living was given by the physicians. By careful bandaging it is now alive and well, six months old, and the hernia is steadily diminishing in size. It is still about the size of the closed fist. Curiously, it is associated with very large double inguinal hernia, both of which are very difficult to control.

No. 41.—J. G., male, aged four years. Right oblique inguinal hernia, congenital, not controlled by truss. Bassini's method. Kangaroo tendon for buried sutures, catgut for the skin. The lower portion of the sac was sutured over testes with fine catgut; no drainage. Patient was in bed two and a half weeks; perfect primary union. Final result, February 21, 1894, perfectly sound.

No. 42.—C. M., male, aged eleven years. Right oblique inguinal hernia, not satisfactorily controlled by truss. Operation November 29, 1892. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. Two and a half weeks in bed; perfect primary union. The truss was worn a few months after operation, and then discarded. Final result, December 15, 1894, perfectly sound.

Nos. 43 and 44.—T. H., male, aged four years. Double oblique inguinal hernia, complicated with spinal disease and incontinence of urine. The hernia on the right side was very large, the size of an orange, of the *cacal* variety, and congenital. A truss had been worn, but the hernia could not be controlled, particularly on account of the plaster-of-Paris jacket, which the patient was obliged to wear for his spinal trouble. The first operation for the right side was performed January 12, 1893. Bassini's method; kangaroo tendon for the buried sutures. The sac, which was large, was sutured high up instead of being ligated. Perfect primary union followed, notwithstanding the fact that the dressing was constantly saturated with urine. Final result, January 2, 1895, perfectly sound; no truss.

The left side was operated upon January 9, 1894, by the Bassini method. The kangaroo tendon was used as usual for the buried sutures. Perfect primary union was obtained; the patient remained in bed three weeks. No drainage was employed in either case. No truss was worn after operation. Final result, January 2, 1895, perfectly sound; no truss.

No. 45.—J. Z., male, aged six years. Left oblique inguinal hernia, size of an egg, complicated with small reducible hydrocele, which prevented successful treatment with truss. Operation January 20, 1893. Bassini's method; kangaroo tendon was employed for the buried sutures and catgut for the skin. Perfect primary union; no drainage. Final result, January 22, 1895, perfectly sound.

No. 46.—C. G., female, aged twenty-one years. Left oblique inguinal hernia, not well controlled by truss. Operation November 4, 1892. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin; primary union; two and a half weeks in bed. Final result, died one year later without relapse.

No. 47.—M. C., female, aged twenty-six years. Right oblique inguinal hernia. Operation December 22, 1892. Bassini's method. Kangaroo tendon for buried sutures, catgut for skin; no drainage; primary union; three weeks in hospital. Final result not traced.

No. 48.—A. C., male, aged thirty-five years; laborer. Right oblique inguinal hernia, relapsed after McBurney's operation, done two years before. Bassini's operation January, 1893. The large amount of cicatricial tissue, resulting from the previous operation, made it impossible to perform a perfectly satisfactory closure. Kangaroo tendon was used for buried sutures, catgut for the skin; no drainage; three weeks in hospital; light truss was worn after operation. Final result not traced.

No. 49.—G. B., male, aged twenty-one years. Right inguinal hernia of several years' duration. He had worn a truss without benefit. Operation January 20, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for skin; no drainage; perfect primary union followed. Final result, January 20, 1895, no relapse.

No. 50.—G. R., male, aged eight years. Left oblique inguinal hernia complicated with undescended testis. The hernia had been observed for four years. Truss had been tried, but was painful. Operation January 18, 1893; Bassini's method. Testis was anchored in the scrotum by means of catgut sutures attached to a wire frame. Kangaroo tendon was used for the buried sutures as usual. Primary union followed. Final result, December, 1894, perfectly sound. Testis found just outside of external ring.

No. 51.—J. D., male, aged nine years. Left oblique inguinal hernia of four years' duration. Hernia was the size of an egg, and mechanical treatment had been carefully tried without improvement. Operation January, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin; no drainage. Patient was kept in bed two and a half weeks; perfect primary union. A truss was worn for six months and then discarded. Final result, November 17, 1894, perfectly sound.

No. 52.—E. G., male, aged fourteen years. Left oblique inguinal hernia size of an egg, of three years' duration. Mechanical treatment tried without improvement. Operation February, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. Duration of treatment two and a half weeks in bed. Perfect primary union. Truss was worn for a few months after operation, then left off. Final result, December 15, 1894, perfectly sound.

No. 53.—A. D., male, aged twelve months. Left oblique inguinal hernia, congenital, strangulated for twenty-six hours. Operation February, 1893. When the patient entered the hospital he was in a condition bordering on collapse, and after a brief but unsuccessful

attempt at reduction by taxis, operation was immediately performed under chloroform anæsthesia. The cæcum and appendix, very much congested, were found in the sac. On relieving the constriction, the bowel regained its normal color, and was returned to the abdominal cavity. The canal was closed by the Bassini method without drainage; kangaroo tendon being used for the buried sutures and catgut for the skin. Complications: the patient had a very high temperature of 107° F. on the day following the operation, and was in a moribund condition during the entire day. He was treated for four days with tub-baths of a temperature of 95° F., and repeated as often as the temperature rose above 103° F. On the fifth day the temperature fell to normal, and convalescence from this time on was uninterrupted. Final result, July, 1894, perfectly sound, having worn no truss since operation.

No. 54.—F. K., male, aged seven years. Left oblique inguinal hernia of several years' duration. Mechanical treatment not effective. Operation February, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. Perfect primary union. Patient remained in bed two and a half weeks. Final result, February 27, 1894, perfectly sound, not wearing truss.

No. 55.—F. S., male, aged fourteen years. Right oblique inguinal hernia, congenital, and complicated with an undescended testis. The testis could be brought down to the external ring, and also be pushed upward into the abdominal cavity. Truss treatment had been tried, but the wearing of any support was painful. Operation March 10, 1893; Bassini's method. The epididymis was partially dissected from the rest of the testis, making it possible to bring the testis farther down into the scrotum, where it was anchored by means of catgut sutures to a wire frame outside of the scrotum. The canal was closed in the usual way, with kangaroo tendon for the buried sutures and catgut for the skin. Perfect primary union followed with but little orchitis. Final result, September 29, 1894, perfectly sound. Testis very much atrophied and retracted to external ring.

No. 56.—M. T., female, aged ten years. Right oblique inguinal hernia of ten years' duration. A truss had been worn the entire time without improvement. Operation March 10, 1893. Bassini's method; canal being closed in the usual way with kangaroo tendon, catgut being used for the skin. Patient remained in bed two and a half weeks. Primary union followed without complications. Final result, February, 1894, perfectly sound.

No. 57.—J. D., male, aged thirty-two years. Right oblique inguinal hernia of several years' duration. Mechanical treatment unsatisfactory. Operation March 3, 1893. Bassini's method; canal closed in usual way with kangaroo tendon for buried sutures and catgut for skin. During the first week after operation the patient contracted facial erysipelas, and had a severe attack, making it necessary for him to be transferred to another hospital in a different part of the city. In spite of this complication the wound healed by primary union. Final result, July, 1894, perfectly sound.

No. 58.—F. G., male, aged ten years. Right oblique inguinal hernia, *cæcal*. The patient had had the hernia since infancy, and it could not be controlled with a truss. The hernia was reducible with the exception of a small portion which was diagnosed as an adherent vermiform appendix. It proved to be such, was four inches in length, and adherent to the sac throughout its entire length. The adhesions, which were old and very firm, were carefully separated as far as the base, the appendix was not removed but reduced into the abdominal cavity, and the sac, which was very voluminous, was closed by catgut sutures. Perfect primary union followed without complications. Final result, December 13, 1894, perfectly sound. No truss worn after operation.

No. 59.—R. Z., female, aged fourteen years. Right femoral hernia of several years' duration. Truss treatment not effective. Operation April 4, 1893. The sac was ligated high up and the purse-string suture of kangaroo tendon was used in closing the crural canal. Perfect primary union followed. The patient was allowed to be up at the end of two and a half weeks. Final result, December 10, 1894, perfectly sound.

Nos. 60 and 61.—A. M., male, aged twelve years. Double oblique inguinal hernia, both sides having relapsed after a Czerny operation, done February 14, 1890, at the Hospital for Ruptured and Crippled. The relapse occurred a few months after the operation, in spite of the fact that a truss had been worn the entire time. In the Czerny operation catgut sutures were used to close the canal. Operation April 11, 1893. Bassini's method; kangaroo tendon was used for the buried sutures, and catgut for the skin. Both sides were operated upon the same day. Perfect primary union followed, and no truss was worn after the operation. Final result: patient was seen October 6, 1894, and both sides were perfectly sound, and not the slightest impulse could be seen on coughing. No relapse January 1, 1895.

No. 62.—V. S., male, aged thirteen years. Right oblique inguinal hernia, congenital, and complicated with the undescended testis. A truss had been worn for some time, but caused considerable pain. Operation February, 1893; Bassini's method. The testis was brought down into the scrotum as far as possible and sutured and anchored by catgut sutures. The wound was closed in the usual way, with kangaroo tendon for the buried sutures and catgut for the skin. Final result, December 15, 1894, perfectly sound. Testis now just outside of external ring.

No. 63.—F. A., male, aged five years. Right oblique inguinal hernia, congenital, very large, and not controlled by truss. Operation April 4, 1893. Bassini's method; kangaroo tendon for buried sutures and catgut for the skin. No drainage. Primary union. Final result, February, 1894, perfectly sound.

No. 64.—F. G., male, aged fifty-one years. Right oblique inguinal hernia of ten years' duration. Mechanical treatment not effective. Operation April 10, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Perfect primary union. Two and a half weeks in bed; three weeks in hospital. Final result, January, 1895, perfectly sound.

No. 65.—G. R., male, aged twenty-one years. Left oblique inguinal hernia of two years' duration, size of an egg. A truss had been worn, but was very painful. Operation May 5, 1893. Bassini's method; kangaroo tendon used for buried sutures and catgut for the skin. Patient remained in bed two and a half weeks, and left the hospital at the end of three weeks. Primary union. Final result, January 15, 1895, perfectly sound.

No. 66.—H. S., male, aged fifteen years. Right oblique inguinal hernia, which had existed since three months of age. The hernia was the size of a goose-egg, and could not be satisfactorily controlled by a truss. Operation May 12, 1893. Bassini's method; kangaroo tendon was used for the buried sutures and catgut for the skin. Patient was in bed two and a half weeks. Perfect primary union followed without complications. Final result, October 2, 1894, perfectly sound.

No. 67.—H. L., male, aged seven and a half months. Right oblique inguinal hernia, congenital, *strangulated cæcum and appendix*. Operation June 1, 1893. The child had been under mechanical treatment at the Hospital for Ruptured and Crippled, but the truss had been left off on the advice of an outside physician. The hernia

had been strangulated for twenty-four hours when brought to the hospital. Chloroform was given, but the hernia could not be reduced by moderate taxis, and operation was immediately performed. The sac was found to contain the vermiform appendix and a portion of the cæcum. The appendix was of very dark color, and evidently too nearly gangrenous to make its return safe. It was removed at the base, and the wound closed by Bassini's method. Kangaroo tendon was used for the buried sutures and catgut for the skin. No drainage was employed. On the day following the operation temperature rose to 106° F., and the general condition was extremely precarious. Was treated with cold baths in a manner similar to that already described in the former case. The baths were continued for a number of days, and the temperature fell, but did not return to normal. The wound healed by perfect primary union. The weight of the child at the time of operation was only eight pounds, although seven and a half months of age. It had been suffering from marasmus, the cause of which could not be ascertained. It gradually continued to decline, and died a few weeks after the operation, having entirely recovered from the hernia.

No. 68.—R. R., female, aged eleven years. Right femoral hernia, which had existed three years. Truss had been worn for two years without any improvement. Operation June 6, 1893. The sac was ligated high up, and a purse-string suture of kangaroo tendon was used to close the crural canal. Perfect primary union; two and a half weeks in bed. Final result, October 20, 1894, perfectly sound; no truss.

No. 69.—J. P., male, aged nine years. Right oblique inguinal hernia, *cæcal*. The boy was suffering from spinal disease, and wearing a plaster jacket, which made it impossible to control the rupture with a truss. The hernia was very large. Operation June, 1893. Bassini's method; kangaroo tendon for the buried sutures and catgut for the skin. Wound healed by primary union. Final result, December 13, 1894, perfectly sound. No relapse February 1, 1895.

No. 70.—F. E., male, aged eleven years. Right oblique inguinal hernia, of several years' duration. The boy was an inmate of an orphan asylum, and it was impossible to carry out satisfactory mechanical treatment. Operation June 15, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. Wound healed by primary union. Final result, October 20, 1894, perfectly sound.

No. 71.—R. G., female, aged twenty-seven years. Right femoral hernia of two years' duration, frequently incarcerated and irreducible in part. Operation June 30, 1893. The sac was ligated high up, canal closed with purse-string kangaroo suture. Patient remained in hospital two and a half weeks. Wound healed by perfect primary union. A double sac was found connected by a small opening about one-quarter of an inch in diameter. A small concretion was found adherent to the septum, which separated the two sacs. A light truss was worn for a short time after the operation, and then discarded. Final result, June 13, 1894, perfectly sound; no truss.

No. 72.—J. A., male, aged eleven years. Right oblique inguinal hernia; truss not effective. Operation July 18, 1893. Bassini's method; kangaroo tendon used for buried sutures, catgut for the skin. No drainage. Profuse suppuration down to the aponeurotic layer occurred. The wound was freely opened to the aponeurosis, and irrigated for several days; the deeper sutures remained intact. Final result, January 11, 1895, perfectly firm. No truss since operation.

No. 73.—P. M., male, aged seventeen. Right oblique inguinal hernia of ten years' duration. Mechanical treatment tried without improvement. Operation July 21, 1893. Bassini's method; kangaroo tendon for the buried sutures. Patient remained in the hospital two and a half weeks, and in bed two weeks. Final result, January, 1895, no relapse; no truss.

No. 74.—H. S., male, aged twenty years; grocer's clerk. Right oblique inguinal hernia of two years' duration. Mechanical treatment tried, but unsatisfactory. Operation July 21, 1893. Bassini's method; kangaroo tendon for buried sutures, and catgut for the skin. Final result, January 2, 1895, perfectly sound; no truss.

No. 75.—G. P., male, aged nine years. Right oblique inguinal hernia of seven years' duration; treated at the Hospital for Ruptured and Crippled by truss for five years without improvement. Operation August, 1893. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Perfect December 11, 1894; no truss.

No. 76.—J. H. S., male, aged fifty years. Left oblique inguinal hernia, irreducible omentum, size of a fist. The patient had had a hernia for many years, but for some time it had not been satisfactorily controlled by a truss. It had been irreducible for several months, and had been treated unsuccessfully by very strong currents of electricity. The patient was very stout, and the abdominal wall

contained a large amount of adipose tissue, making the operation unusually difficult. Operation was performed February 4, 1893. The omentum was reduced, there being no firm adhesions, and the wound was closed in the usual way with kangaroo tendon for the buried sutures and catgut for the skin. No drainage was employed. Primary union occurred, with the exception of a little breakdown of the fatty tissue, which discharged through a suture opening. Patient has worn a light truss since the operation. Final result, January 22, 1895, no relapse.

No. 77.—M. B., male, aged twenty-three years. Right oblique inguinal hernia, not satisfactorily controlled by truss. Operation August 11, 1893. Bassini's method; kangaroo tendon used for buried sutures, catgut for the skin. No drainage. Perfect primary union. Patient left the hospital at the end of three weeks. Perfectly firm February 10, 1895. No truss worn since operation.

No. 78.—W. Y., male, aged eleven years. Right oblique inguinal hernia, which had existed since birth. The hernia was the size of a goose-egg, and could not be held with truss. It was complicated with a reducible hydrocele. Operation August, 1893. Bassini's method, with kangaroo tendon for the buried sutures, and catgut for the skin. No drainage. Perfect primary union. Patient remained in bed two and a half weeks. Final result, three months later, sound.

No. 79.—N. C., female, aged eight years, umbilical hernia, congenital. The hernia was about the size of a walnut, and had shown no improvement under mechanical treatment. Operation August 29, 1893. The umbilicus was excised, sac ligated and removed, peritoneum closed with catgut sutures, fascia with kangaroo tendon, which was buried, and the skin was sutured with catgut. Plaster-of-Paris dressing was applied, and the wound dressed on the ninth day. Perfect primary union followed. Final result not traced.

No. 80.—W. M., male, aged eleven years. Right oblique inguinal hernia, congenital. The boy had worn a truss since a baby without improvement. Operation August 15, 1893. Bassini's method; kangaroo tendon was used for the buried sutures, catgut for the skin. No drainage. Patient remained in bed three weeks. Wound healed by perfect primary union. Final result, December 11, 1894, perfectly sound. No truss since operation.

No. 81.—A. A., female, aged twelve years. Right femoral hernia of seven years' duration. Truss had been worn the entire time without any improvement. Hernia was about the size of an English wal-

nut. Operation September 25, 1893. The sac was ligated high up the crural canal, and was closed by means of a purse-string kangaroo suture; no drainage. Patient remained in bed three weeks. Perfect primary union followed. Final result, November 1, 1893, perfectly sound. Not traced since.

No. 82.—F. F., male, aged twenty-five years. Left oblique inguinal hernia of several years' duration. Hernia was not satisfactorily controlled by a truss. Operation September 1, 1893; Bassini's method. Kangaroo tendon was employed as usual for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Patient left the hospital at the end of three weeks. Final result, January 22, 1895, perfectly sound. No truss since operation.

No. 83.—M. T., male, aged twenty-five years. Right oblique inguinal hernia, reducible. Duration not known. Patient speaks only Italian, and a good history could not be obtained. The hernia was not well controlled by a truss. Operation October 5, 1893. Bassini's method; kangaroo tendon used for the buried sutures, catgut for the skin. Patient was in bed two and a half weeks, and left hospital at the end of three weeks. Perfect primary union occurred. Final result, January 22, 1895, perfectly firm. No truss worn since operation.

No. 84.—C. B., male, aged twenty-one years. Right oblique inguinal hernia, irreducible omentum. The hernia had existed since childhood, and the patient had never worn a truss. It had been irreducible for two months. Operation October, 1893. Bassini's method; kangaroo tendon was used for the buried sutures and catgut for the skin. No drainage was employed. The adhesions were separated from the omentum, and it was returned to the abdominal cavity. The patient remained in bed two and a half weeks, and at the end of three weeks left the hospital. Perfect primary union followed, and no truss was worn after operation. Final result not traced.

No. 85.—J. R., male, aged five years. Right oblique inguinal hernia, congenital. The hernia could not be held by a truss. Operation October 10, 1893. Bassini's method; kangaroo tendon used for the buried sutures, catgut for the skin. No drainage. Wound was dressed as usual on the eighth day, and perfect primary union followed. Truss was worn for a few months after operation, then left off. Final result, January 1, 1895, perfectly sound; no truss.

No. 86.—M. F., male, aged twelve years. Right oblique inguinal hernia of six years' duration, size of a hen's egg. Truss had been

worn the entire time without improvement. Operation October 10, 1893. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Patient remained in bed two and a half weeks, and left the hospital at the end of three. No truss was worn after operation. Final result, January 6, 1895, perfectly sound.

Nos. 87 and 88.—A. B., male, aged five years. Double oblique inguinal hernia, which had existed since the child was a few months old. A truss had been worn the entire time without improvement. Operation October 17, 1893; Bassini's method. Both sides were operated upon the same day. Kangaroo tendon was used for the buried sutures, catgut for the skin. No drainage required. The aponeurosis on the left side was sutured with catgut, the supply of kangaroo having given out. Final result, September 25, 1894, no relapse.

No. 89.—L. S., male, aged ten years. Right oblique inguinal hernia of three years' duration, not controlled by a truss. Operation November 14, 1893. Bassini's method; kangaroo tendon was used for the buried sutures and catgut for the skin. No drainage. Perfect primary union followed. No truss worn after operation. Final result, September 29, 1894, perfectly sound.

No. 90.—C. S., male, aged seven years. Double oblique inguinal hernia. The hernia had existed from infancy, but operation proved neither side to have been congenital. The hernia was very large, being the size of a goose-egg on either side. Operation November 14, 1893. Both sides were operated upon at the same time. Dr. Bull operated upon the left side, and Dr. Coley upon the right. The lower end of the sac was removed on the right side, but left *in situ* on the left. The canal was closed on both sides by Bassini's method; kangaroo tendon was used for the buried sutures. Both wounds healed by a perfect primary union. Final result, January 2, 1895, perfectly sound; no truss.

No. 91.—T. C., male, aged four and a half years. Right oblique inguinal hernia, *cæcal*. The hernia had been treated at the Hospital for Ruptured and Crippled, but no form of truss could be worn to control it. It was the size of an orange, and the canal easily admitted two fingers. Operation November 21, 1893. The hernia had existed since birth, but the operation proved that it could not have been congenital. The sac was very adherent to the tunica vaginalis, and its removal was much more difficult than usual. The wound was closed

in the usual way, with kangaroo tendon for the buried sutures and catgut for the skin. No drainage was employed. The sac was found to contain the cæcum. The wound healed by primary union, but a severe orchitis subsequently going on to suppuration developed. This, however, had no untoward effect upon the hernia wound. Final result, January 14, 1895, perfectly sound; no truss.

Nos. 92 and 93.—D. S., female, aged fourteen years. Double oblique inguinal hernia. The hernia had existed but a few months, but operation was advised on account of the difficulty of securing proper attention to the truss. Operation November 28, 1893; Bassini's method. Both sides were operated upon the same day. The time occupied in doing both operations was twenty-nine minutes. Kangaroo tendon was used for the buried sutures, catgut for the skin. Both wounds healed by primary union, with the exception of a slight superficial stitch-hole abscess on one side. Final result, December 7, 1894, perfectly sound.

No. 94.—W. S. G., male, aged nineteen years. Right oblique inguinal hernia of three months' duration, irreducible omentum. Operation December 1, 1893. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Omentum returned to the abdominal cavity. Patient remained in bed two weeks, hospital twenty days. Perfect primary union followed. No truss worn after operation. Patient's occupation, foundry work, necessitating heavy lifting. Final result, January 15, 1895, perfectly sound.

Nos. 95 and 96.—H. S., male, aged eight and a half years. Double oblique inguinal hernia, congenital, size of a fist on both sides. Right side proved to be *cæcal*. Neither side could be controlled by truss. Operation on the right side December 1, 1893. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union followed. Left side was operated on December 19, 1893; Bassini's method. Wound closed same as on the right side, canal closed in the usual way. Final result, June 26, 1894, perfectly sound.

No. 97.—B. R., male, aged six years. Left oblique inguinal hernia complicated with Pott's disease and hip-disease. The hernia developed while the child was wearing a plaster jacket, the pressure of which undoubtedly contributed towards producing the hernia, and could not be held by a truss. Operation December 22, 1893. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Primary union followed. Final result, December 20, 1894, no relapse; no truss.

No. 98.—I. D., male, aged seven and a half years. Right oblique inguinal hernia, which had existed since the child was five weeks old. It had never been held by a truss, and was of large size. Operation December 29, 1893. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, perfectly sound December 15, 1894; no truss.

No. 99.—T. C., male, aged twenty-seven years. Left oblique inguinal hernia, size of an egg; four weeks' duration. Truss was painful, and the patient was desirous of permanent cure. Operation January 26, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, perfectly sound January 2, 1895. No truss worn since operation.

No. 100.—G. R., male, aged three years and nine months. Left oblique inguinal hernia complicated with Pott's disease. The hernia had existed nine months, and developed soon after the patient began to wear a plaster jacket for spinal trouble. It rapidly increased in size, and could not be controlled by truss. Operation January 9, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union followed. On February 2 the patient developed tubercular meningitis, which ran a characteristic course, and he died two weeks later.

Nos. 101 and 102.—G. T., male, aged eight years. Double oblique inguinal hernia complicated with Pott's disease. The hernia on both sides had developed while wearing the plaster jacket. Operation January 30, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. The patient remained in bed the usual time, two and a half weeks. No truss since operation. Final result, September 24, 1894, perfectly sound.

No. 103.—B. R., aged six years. Right oblique inguinal hernia complicated with Pott's disease. This patient was operated upon for left oblique inguinal hernia in December, 1893. (*Vide* Case 97.) Operation on the right side February 6, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Perfect primary union. No truss worn after operation. Final result, January 11, 1895.

No. 104.—F. R., male, aged seven and a half years. Left oblique inguinal hernia. Patient had a rupture in infancy which

disappeared without treatment. One year ago the hernia reappeared, and has continued to increase in size in spite of mechanical treatment. Operation February 13, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. Patient remained in bed two and a half weeks. Perfect primary union followed. Final result, December 15, 1894, perfectly sound; no truss.

No. 105.—I. W. L., male, aged fifty-one years. Right oblique inguinal hernia, irreducible omentum. Operation at Post-Graduate Hospital, December, 1893; Bassini's method. A large mass of adherent omentum was ligated with catgut, the canal closed with kangaroo tendon for the buried sutures and catgut for the skin. No drainage. Perfect primary union. Two and a half weeks in bed. Final result, January 23, 1895, perfectly sound; has worked constantly at his trade (carpenter). Since operation no truss has been worn.

No. 106.—L. D., male, aged four years. Left oblique inguinal hernia, congenital, size of a large orange, not controlled by truss. Operation February 13, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Patient remained in bed two and a half weeks. Wound healed by perfect primary union. Final result, no relapse three months after operation.

Nos. 107 and 108.—W. L., male, aged two and a half years. Double oblique inguinal hernia, which had existed since the child was six weeks old, and neither side could be controlled by truss. Operation February 16, 1894; right side. Kangaroo tendon was used for the buried sutures, catgut for the skin. No drainage. Patient developed measles during the wound healing, which, however, did not interfere with primary union. Final result, September 28, 1894, perfectly firm. The left side was operated upon September 27, 1894. Bassini's method, with kangaroo tendon for the buried sutures. No drainage. Final result, January 21, 1895, no relapse; no truss.

No. 109.—A. B., male, aged six years. Right oblique inguinal hernia, reducible, not well controlled by truss. Operation February 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. During the operation the patient took ether very badly, and the day following the operation there were well marked signs of congestion of the lungs, associated with high temperature and rapid respiration. The dressing was removed and the wound found to be in good condition. The condition continued to become more and more serious, and death occurred on the eighth day. An autopsy showed the wound in good condition,

and nothing abnormal in the abdomen. Extensive double pneumonia was found in lungs. It was learned that the child had had measles five weeks previous to entering the hospital, and the lungs had undoubtedly not sufficiently recovered to make the administration of ether perfectly safe. Death was undoubtedly due to pneumonia caused by the anæsthetic.

Nos. 110 and 111.—C. S., male, aged nineteen years; clerk. Double oblique inguinal hernia of two years' duration. In August, 1893, both sides had been subjected to the so-called injection treatment for radical cure. No benefit had followed the treatment. Operation March 16, 1894; Bassini's method. Both sides were operated upon on the same day. The sac on both sides was found very adherent to the omentum as well as to the overlying tissues, and dissection was difficult. The sacs, however, were ligated high up and removed. The canal was closed in the usual way, using kangaroo tendon for the buried sutures and catgut for the skin. No drainage. Perfect primary union followed, and patient left the hospital at the end of three weeks. Final result, December 10, 1894, perfectly sound.

No. 112.—C. F. H., male, aged twenty-five years. Double oblique inguinal hernia; left side only operated upon. The hernia on the left side had existed since infancy, was the size of two fists, and could not be controlled by any truss. Mechanical apparatus had been worn during the entire time. Operation March 23, 1894. Bassini's method, with kangaroo tendon for the buried sutures and catgut for the skin. Patient remained in the hospital two and a half weeks. Perfect primary union followed. Not the slightest swelling of testis or cord observed. No truss worn after operation. Final result, January 2, 1895, perfectly sound.

No. 113.—L. P., male, aged nine years. Right oblique inguinal hernia, which had existed since the child was eight months old. Truss had been worn the entire time, and for the past two and a half years the child had been treated at the Hospital for Ruptured and Crippled, without any improvement. The hernia was scrotal, and the size of a large egg. Operation showed it to be congenital. Operation April 10, 1894. Bassini's method; kangaroo tendon employed for the buried sutures, catgut for skin. No drainage. Perfect primary union followed. Final result, October 6, 1894, perfectly sound.

No. 114.—K. B., female, aged twelve years. Double oblique inguinal hernia, congenital. The hernia had been observed on both

sides since infancy, and a truss had been worn the entire time without improvement. Operation April 20, 1894. Both sides operated upon at the same time, the left side by Dr. Bull and the right by Dr. Coley. Kangaroo tendon was used for all buried sutures on the right side and catgut for the skin. On the left side the kangaroo was used only for the layer underneath the cord, the aponeurosis and skin being closed with catgut. No drainage employed on either side. Primary union. Two and a half weeks in bed. Perfectly sound December 14, 1894.

No. 115.—J. K., aged six years. Left oblique inguinal hernia, which had existed since infancy. The patient had been treated three years, at the Hospital for Ruptured and Crippled, by mechanical means, without improvement. Operation April 19, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Patient remained in bed two and a half weeks, and left the hospital at the end of three weeks. Final result, December 14, 1894, sound.

No. 116.—J. D., male, aged eight and a half years. Right oblique inguinal hernia of vermiform appendix. The hernia had existed since the child was three years of age, and the child had been treated the entire time at the Hospital for Ruptured and Crippled. The hernia could be reduced, but traction on the testis caused it to reappear, showing that its contents was adherent to the sac. Probably a diagnosis of hernia of the vermiform appendix was made before the operation. Operation April 20, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. The hernia was found not to have been congenital, and the contents consisted of the vermiform appendix only. The appendix was very large, being five and a half inches in length and attached by several strong adhesions to the sac throughout its entire length. The appendix had a long mesentery almost to the tip. The adhesions were cut and tied with catgut as far as the base, and, as it was believed that the removal of the appendix would necessarily add to the risk of the operation, it was decided to return it to the abdominal cavity. The large sac was then closed with three layers of catgut sutures. The cord was transplanted as usual, and the typical Bassini operation performed. No drainage was employed. Perfect primary union occurred. Final result, December 16, 1894, perfect.

No. 117.—J. S., male, aged ten years. Left oblique inguinal hernia since infancy, but not congenital. Hernia was the size of an orange, and could not be controlled by truss. Operation March 30,

1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. There was some orchitis the first week, which disappeared rapidly under an ice-bag. Final result, January 1, 1895, perfectly sound. No truss since operation.

No. 118.—H. L. B., male, aged twenty-three years. Right oblique inguinal hernia, congenital. The hernia had been strangulated the day previous to the operation, but was reduced by taxis. The patient was desirous of having a radical cure, and operation was advised. Operation April 4, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Perfect primary union. Not traced.

No. 119.—H. K., male, aged fourteen years. Left oblique inguinal hernia, which had existed since infancy. The truss had been worn most of the time without any improvement. Operation May 8, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, December 7, 1894, perfectly sound; no truss.

No. 120.—G. H., male, aged forty-seven years. Left oblique inguinal hernia, irreducible omentum. The hernia had existed for a number of years, and had been irreducible for one year. Operation May, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. The sac was very thin and the omentum firmly adherent, so that the omentum was ligated, together with the sac, high up. No drainage was employed. The patient was stout, and the abdominal walls contained a very thick layer of fat. The wound itself healed by primary union, although there were several stitch-hole abscesses due to the breaking down of fatty tissue. These closed up very quickly, and patient was able to leave the hospital at the usual time, three weeks after the operation. He has worn no truss since. Final result, December 15, 1894, perfectly sound.

No. 121.—H. D., male, aged four years. Right oblique inguinal hernia, *cæcal*. The hernia was a relapse from a previous operation performed in December, 1893, by another surgeon at the New York Hospital. At the first operation the hernia was very large and irreducible. The cæcum was so firmly adherent to the sac that it required a long and careful dissection. The testis was removed. The wound suppurated badly, and the hernia relapsed shortly after the operation.

Second operation May 15, 1894. The hernia was the size of a

goose-egg, and consisted of an irreducible cæcum covered with cicatricial tissue, and so firmly adherent to the overlying structures that it could be separated only with the greatest difficulty. No sac whatever could be found. The cæcum was freed sufficiently high to allow it to be replaced within the abdominal cavity, and as the testis had been removed at the previous operation, the wound was closed in three layers, with kangaroo tendon for the deeper and catgut for the skin. Very slight suppuration at the lower angle of the wound occurred, otherwise there were no complications. Final result, December 11, 1894, perfectly sound.

No. 122.—F. V., male, aged eleven years. Right oblique inguinal hernia of eight years' duration. A truss had been worn the entire time without improvement. Operation May 8, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Primary union followed. The patient was up and about in two and a half weeks. Final result, December 14, 1894, perfectly sound. No truss worn since operation.

No. 123.—M. E. B., female, aged thirty-four years. Right oblique inguinal hernia of twelve years' duration. Operation May 25, 1894. The incision was made as in the Bassini operation, the sac ligated high up, and the wound closed in precisely the same manner as in the male,—in three layers. Kangaroo tendon was used for the deeper layers, catgut for the skin. No drainage. Primary union followed. The patient left the hospital at the end of two and a half weeks. No truss worn since operation. Perfectly sound December 10, 1894.

No. 124.—E. E., female, aged twenty-five years. Left oblique inguinal hernia of two years' duration. Truss had been worn the entire time without improvement. Hernia was the size of an egg. Operation May 11, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. The patient was in bed two and a half weeks, and left the hospital at the end of three weeks. Perfect primary union. Final result, December, 1894, perfectly sound; no truss.

No. 125.—J. McD., male, aged sixteen years. Right oblique inguinal hernia of two years' duration. The operation, however, showed it to have been congenital. Operation May 23, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. The patient left the hospital at the end of two weeks, perfect primary union having occurred. Final result, January 22, 1895, no relapse.

No. 126.—J. J., male, aged thirty-four years. Left direct inguinal hernia of one year's duration. The patient was anxious to do away with the truss, and desired operation. Operation May 23, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Perfect primary union. Patient left the hospital at the end of three weeks. Final result, October 15, 1894, no relapse.

No. 127.—J. W. S., male, aged twenty-three years. Left oblique inguinal hernia of several years' duration. Operation May 10, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Patient left the hospital at the end of two and a half weeks. Final result, January 1, 1895, perfectly sound.

No. 128.—L. K., female, aged thirteen years. Umbilical hernia, congenital. The hernia was about the size of a walnut, and showed no improvement under mechanical treatment. Operation June 12, 1894. The sac was excised, peritoneum sutured with catgut, the fascia with kangaroo tendon, and the skin with catgut. No drainage. Final result, December 14, 1894, perfectly sound.

No. 129.—J. O'C., male, aged nine years. Left oblique inguinal hernia, congenital, and complicated with undescended testis. Operation June 12, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. The testis was anchored in the scrotum. Slight orchitis followed the operation. Perfect primary union. Final result, December 15, 1894, sound.

No. 130.—C. S., male, aged eight years. Right oblique inguinal hernia, which had existed since infancy. A truss had been worn for three years without improvement. Operation June 23, 1894; Bassini's method. The hernia was found to be congenital. Sac was excised high up, and the redundant portion of the lower end removed, leaving just sufficient to cover the testicle. This part was closed by means of a purse-string suture of catgut. The canal was closed in the usual way, with kangaroo tendon for the buried sutures and catgut for the skin. Perfect primary union followed. Final result, January 1, 1895, perfectly sound. No truss worn since operation.

No. 131.—M. F., female, aged four years. Ventral hernia, congenital. The hernia was about the size of an English walnut, and the opening, which was three-fourths of an inch in diameter, was situated three-fourths of an inch above the umbilicus. A second smaller opening was found half an inch above and a little to the left

of the first. The patient had been treated by means of mechanical support at the Hospital for Ruptured and Crippled for eighteen months without improvement. Operation June 19, 1894. The peritoneum was sutured with catgut, the fascia with kangaroo, and the skin with catgut. Perfect primary union followed. Final result, September 29, 1894, perfect, not the slightest impulse on coughing.

No. 132.—W. K., male, aged seven and a half years. Left oblique inguinal hernia of several years' duration. Treated by mechanical means without improvement. Operation May 18, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Final result, July 15, 1894, perfectly sound.

No. 133.—A. B., female, aged four years. Right oblique inguinal hernia of two and a half years' duration. Truss had been worn two years without improvement. Operation July 6, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, October 3, 1894, perfect.

No. 134.—M. T., female, aged twenty-six years. Right oblique inguinal hernia of fourteen years' duration. No improvement had followed mechanical treatment. Operation June 27, 1894. Bassini's method; kangaroo tendon for the buried sutures and catgut for the skin. No drainage. The patient was in bed two weeks, and left the hospital at the end of three weeks. Perfect primary union followed. Final result, January 20, 1895, perfectly sound; no truss.

No. 135.—G. H., male, aged seven years. Left oblique inguinal hernia complicated with reducible hydrocele. The hernia had existed six months, but owing to the fluid keeping the canal constantly distended, mechanical treatment was of little effect. Operation July 9, 1894. Bassini's method; kangaroo tendon for the buried sutures and catgut for the skin. No drainage. Perfect primary union followed. The patient left the hospital at the end of three weeks. Sound December 15, 1894; no truss.

No. 136.—C. H. P., male, aged nineteen years. Left oblique inguinal hernia of one year's duration. Operation July 14, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union followed. Final result, January 22, 1895, perfectly sound.

No. 137.—W. K., male, aged six years. Right oblique inguinal hernia, which had existed since the child was three months of age. Truss had been worn the entire time without any improvement. The

patient's father and grandfather were both ruptured. Operation July 10, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union followed. Final result, December 13, 1894, perfectly sound.

No. 138.—R. M., male, aged ten years. Left oblique inguinal hernia of four years' duration. Mechanical treatment tried without improvement. Operation July 10, 1894. Bassini's method; kangaroo tendon for the buried sutures and catgut for the skin. No drainage. Perfect primary union. Two and a half weeks in bed. Final result, September 4, 1894, perfectly sound; no truss. Perfect January 12, 1895.

No. 139.—J. L., male, aged seven years. Right oblique inguinal hernia, which had existed since six weeks of age. The patient had been treated at the Hospital for Ruptured and Crippled for seven years without improvement. The hernia was the size of a goose-egg, and was usually down when the patient came for treatment. Operation July 20, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, December 11, 1894, perfectly sound.

No. 140.—W. H., male, aged nine years. Right oblique inguinal hernia of several years' duration. Patient had been treated with a truss for two years without any improvement. Operation July 20, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Two and a half weeks in bed. Final result, January 15, 1895, perfectly sound.

No. 141.—F. L., male, aged twelve years. Right oblique inguinal hernia. The hernia first appeared when the child was four years of age, and operation showed it to be congenital. Operation July 7, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, December 15, 1894, perfectly sound.

No. 142.—Mrs. O. C., aged sixty-two years. Large irreducible omental ventral hernia; frequent attacks of incarceration. The hernia was about the size of the fist, and was situated midway between the umbilicus and symphysis pubes. The hernia had existed for many years, but had given little trouble until two years previous to operation. During the last six months there had been several attacks of severe colicky pain in the abdomen, with nausea and vomiting. During these attacks the hernia increased considerably in size, and

was exceedingly tender. The last attack was so severe in character that operation was advised. Operation July 24, 1894. An elliptical incision was made, including the entire skin covering the tumor, and the dissection was carried on until the fascia constricting the neck of the sac was exposed. A large mass of omentum, size of fist, was found in the sac, everywhere attached to the peritoneum by old and very firm adhesions. It was impossible to separate these adhesions. The opening in the abdomen was sufficiently large to expose healthy omentum beyond the adhesions. The mass of omentum was tied off with catgut in small sections just beyond the neck of the sac. The central portion of the omentum was of almost bony hardness, due to the frequent inflammatory attacks. The wound was closed in three layers; catgut for the peritoneum, buried kangaroo tendon for the fascia, and a row of sutures of silkworm gut placed so as to include the skin and fascia. The wound was dressed on the eighth day, and found to have healed by perfect primary union. The patient had no reaction following the operation, and convalescence was uninterrupted. Final result, January 1, 1895, no relapse.

Nos. 143 and 144.—J. W., male, aged nine years. Double oblique inguinal hernia of four years' duration, complicated with double reducible hydrocele. The patient had been treated at the Hospital for Ruptured and Crippled by means of a truss for a year without any improvement. Operation August 7, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Perfect primary union. Final result, January 10, 1895, perfect.

No. 145.—H. M., male, aged seven years. Hernia of the vermiform appendix, adherent, reducible. Right oblique inguinal hernia, which had existed since infancy, but not congenital, as shown by operation. The diagnosis of an adherent vermiform appendix was made before the operation. The appendix could be definitely made out in the scrotum, and could be traced as far as its attachment to the cæcum. It could be reduced into the abdominal cavity, but traction on the testis caused it to reappear, showing it must be adherent to the sac. Operation August 14, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. On opening the sac, its contents were found to consist of the vermiform appendix alone. The appendix was three inches in length, and its tip was firmly adherent to the lower portion of the sac. The adhesions were separated, tied off with catgut, after which the appendix was reduced into the abdominal cavity. The sac was sutured with a layer of kangaroo tendon

and a skin layer of catgut sutures. The sac had no connection with the tunica vaginalis, showing that it must have been an acquired hernia. Perfect primary union. Final result, December 15, 1894, no relapse.

No. 146.—Mrs. C., aged thirty years. Irreducible umbilical hernia the size of an orange. Operation August 2, 1894. The skin as far as the base of the tumor was removed, the omentum ligated beyond the neck of the sac in small portions with catgut ligatures. The peritoneum was sutured with catgut, the fascia with buried sutures of kangaroo tendon, and the skin, including fascia, was sutured with silkworm gut. Perfect primary union followed. Final result, October 1, 1894. No relapse January 1, 1895.

No. 147.—J. M., male, aged nine years. Right oblique inguinal hernia of several years' duration. Operation August 30, 1894, Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Final result, January 1, 1895, perfectly sound.

No. 148.—R. C., male, aged fourteen years. Left oblique inguinal hernia, which had existed since infancy. The patient had been treated at the Hospital for Ruptured and Crippled by means of a truss for some years, and was considered cured. The hernia relapsed one year ago, and was the size of an egg at the time of operation. Operation August 14, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. The hernia proved to be sigmoid, and was adherent at the upper part of the sac. Slight suppuration after the tenth day. Final result, January 1, 1895, no relapse.

No. 149.—C. N., male, aged nine years. Right oblique inguinal hernia, congenital. The hernia was the size of a large orange, and a truss had been worn since two years of age without any improvement. Operation August 21, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, December, 1894, perfectly sound.

No. 150.—H. V., male, aged four years. Right oblique inguinal hernia, which had existed since infancy. Truss had been worn, but without benefit. Operation showed the hernia to have been acquired, and not congenital. Operation August 28, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. The sac was found to be occluded by old adhesions. The lower end of the sac was removed. No drainage. Perfect primary union followed. Final result, January 3, 1895, perfectly sound.

No. 151.—J. R., male, aged twenty-five years. Left oblique

inguinal hernia of six months' duration. Operation September 7, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. No truss. No relapse, January 15, 1895.

No. 152.—J. McG., male, aged ten years. Right inguinal hernia of seven years' duration. He had worn a truss for six years without benefit. Operation September 5, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, January 15, 1895, no relapse.

No. 153.—L. P., male, aged five years. Right inguinal hernia of three years' duration. Operation October 1, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. No drainage. Perfect primary union. Final result, January 12, 1895, perfectly sound; no truss.

No. 154.—J. P., male, aged six years. Left inguinal hernia of three years' duration. Operation October 1, 1894. Bassini's method; kangaroo tendon for the buried sutures. No drainage. Perfect primary union. Final result, January 12, 1895, perfectly sound.

No. 155.—O. A., male, aged six years. Right inguinal hernia of four years' duration. He had worn a truss four years without benefit. The hernia was found to be congenital. Operation October 9, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. No drainage. Perfect primary union. Sound, January 18, 1895.

No. 156.—J. S., male, aged five and a half years. Right inguinal hernia the size of an orange. It had existed only six months, but was complicated with a large reducible hydrocele that prevented it from being controlled by a truss. Operation October 9, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. No drainage. The sac was found to be partially divided by several thin partitions. Perfect primary union. No truss. No relapse, January 15, 1895.

No. 157.—P. H., aged thirteen years. Right femoral hernia size of a hen's egg, and of six years' duration. No improvement had followed constant wearing of truss. Operation October 5, 1894, Post-Graduate Hospital. High ligation of sac. Suture of crural canal with kangaroo tendon. No drainage. Final result, January 11, 1895, no relapse.

No. 158.—A. B., female, aged nine years. Right inguinal hernia of one and a half years' duration. Truss tried without benefit. Operation October 9, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. No drainage. Perfect primary union. No relapse, January 22, 1895.

No. 159.—J. H., male, aged six and a half years. His father died of strangulated hernia. Right inguinal hernia of four and a half years' duration. Operation October 9, 1894. Bassini's method; kangaroo tendon for the buried sutures, and catgut for skin. No truss. Time of operation twenty minutes. Perfect primary union. No relapse, January 15, 1895.

No. 160.—H. K., female, aged nine years. Right inguinal hernia of six years' duration. No improvement has followed mechanical treatment. Operation September 27, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. Final result, January 12, 1895, no relapse.

No. 161.—C. B., female, aged four years and eight months. Right inguinal hernia, congenital. Mechanical treatment had been tried without benefit. Operation October 5, 1894, Post-Graduate Hospital. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union followed. Patient left the hospital at end of sixteen days. No relapse, January 15, 1895.

No. 162.—J. H., female, aged thirty-four. Umbilical hernia the size of an orange of ten years' duration. It was caused by a kick. It was adherent but reducible. Operation October 11, 1894. Omphalotomy with suture of wound in three layers. Kangaroo tendon was used for buried sutures, and silkworm-gut sutures were placed to include all the layers down to the peritoneum. No drainage. Perfect primary union. Patient was advised to wear belt after operation. Sound January 5, 1895.

No. 163.—L. H., male, aged twenty-one years. Left inguinal hernia of three years' duration. It was held with difficulty with truss and painful. Operation October 18, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for peritoneum. No drainage. Perfect primary union. No relapse, January 15, 1895.

No. 164.—E. K., male, aged five months. Hernia, congenital, strangulated two and a half days. Operation October 22, 1894. The hernia had been down sixty hours, and patient had been vomiting most of the time, with no passage of bowels. A tumor the size

of a goose-egg occupied the inguinal canal, and the ring was very tight. Taxis had been tried two days by the physician in charge. Bassini's method with kangaroo tendon for the buried sutures; no drainage. Perfect primary union followed.

Nos. 165 and 166.—P. H., male, aged eleven years. Double inguinal hernia, congenital, on both sides. A truss had been worn without benefit. Operation October 25, 1894, Post-Graduate Hospital; Bassini's method. Chromicized catgut was employed for the buried sutures on the left side and kangaroo tendon on the right. Both sides healed by primary union, but after the patient had been up and about for several days, two small sinuses appeared in the left cicatrix, and remained open for several weeks. No sutures came out, and the sinuses finally closed. Final result, January 22, 1895, sound.

No. 167.—H. K., male, aged thirteen years. Right inguinal hernia of six years' duration. Truss was worn the entire time without benefit. Operation October 26, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Time of operation fifteen minutes. Perfect primary union. Sound December 20, 1894; no truss.

No. 168.—W. B., male, aged twelve years. Right inguinal hernia, which had existed since infancy. Operation October 26, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for skin. Perfect primary union. Final result, January 3, 1895, sound.

No. 169.—J. McM., male, aged eleven years. Left inguinal hernia of three years' duration. He had worn a truss for two years without benefit. Operation October 26, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for skin. Perfect primary union. Final result, January 2, 1895, no relapse.

Nos. 170 and 171.—J. M., male, aged ten and a half years. Double inguinal hernia of three years' duration, and caused by a fall. Treated entire time at Hospital for Ruptured and Crippled without benefit. Operation October 26, 1894; Bassini's method. Both sides operated on same day. Time, thirty-five minutes for both operations. Kangaroo tendon was used for buried sutures, catgut for skin. No drainage. Perfect primary union. Final result, January 3, 1895, perfect.

No. 172.—M. A., male, aged four years. Right inguinal hernia, congenital, size of a goose-egg. Operation Post-Graduate Hospital, November 7, 1894. Bassini's method; kangaroo tendon for

buried sutures, catgut for skin. No drainage. Perfect primary union. No relapse, January 15, 1895.

No. 173.—L. H., female, aged twenty-one years. Right inguinal hernia of seven years' duration. Truss worn two years without benefit. Operation November 15, 1894, Post-Graduate Hospital. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. No drainage. Perfect primary union followed, and patient left hospital at end of sixteen days. No relapse, January 15, 1895.

No. 174.—L. H., female, aged twenty-eight years. Right femoral hernia, strangulated fourteen hours. Hernia had existed several years, and had been strangulated once before, and reduced under ether. Taxis had been thoroughly tried under anæsthesia without effect. Operation October 29, 1894. The sac was very much thickened and of very dark color. Some fluid was found in sac. The bowel was reduced, sac ligated high up, and the crural canal closed with interrupted sutures of kangaroo tendon, without drainage. Perfect primary union followed, and patient was up and about at end of two and a half weeks. Final result, January 23, 1895, perfectly sound.

No. 175.—J. L., male, aged three and three-fourths years. Right inguinal hernia since two months old. No benefit had been derived from mechanical treatment. Operation November 8, 1894, at Post-Graduate Hospital. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Perfect primary union. Patient left hospital at end of two and a half weeks. Final result, perfectly sound January 22, 1895.

No. 176.—W. S., male, aged thirteen years. Right inguinal hernia complicated with reducible hydrocele. Operation November 2, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Perfect primary union followed. Final result, perfectly sound January 3, 1895.

No. 177.—A. W., male, aged seven and a half years. Double inguinal hernia of several years' duration. He had been treated with truss the entire time at the Hospital for Ruptured and Crippled without improvement. Operation November 16, 1894. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, perfect January 12, 1895.

No. 178.—J. McN., male, aged thirty-five years. Left inguinal

hernia of several years' duration, and size of the fist. It was not held well by truss. Operation November 15, 1894. Bassini's method, with kangaroo tendon for the buried sutures, and no drainage. The wound healed primarily, and the patient was allowed to get up at the end of sixteen days. On the seventeenth day he had pains over the upper part of cicatrix and some rise of temperature. The edges of the wound were separated for about half an inch, and a superficial collection of pus was evacuated. The wound quickly healed, and the patient left the hospital four weeks from time of operation. Final result, sound January 22, 1895.

No. 179.—C. D., male, aged twenty-six years. Right inguinal hernia of two years' duration. He had worn truss entire time, and the first year the rupture had been satisfactorily held. During the last year it had been coming down with increasing frequency, and caused considerable pain and more annoyance. Operation November 27, 1894, at Post-Graduate Hospital. Bassini's method; kangaroo tendon for buried sutures, catgut for skin. No drainage. Perfect primary union followed. The patient left the hospital at the end of three weeks. Final result, perfectly sound January 20, 1895.

No. 180.—Female, aged seven years. Right inguinal hernia of two and a half years' duration, which had not been improved by truss treatment. Operation December 1, 1894, at Post-Graduate Hospital. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Final result, perfectly sound January 22, 1895.

Nos. 181 and 182.—C. R., male, aged nine years. Double inguinal hernia of five years' duration. The boy had worn truss for four years without benefit. Operation November 30, 1894. Bassini's method on both sides; kangaroo tendon was used for the buried sutures, catgut for the skin. No drainage. Primary union. Final result, perfectly sound January 22, 1895.

No. 183.—A. P., female, aged thirty-six years. Recurrent umbilical hernia the size of a fist. First operation had been performed in January, 1894, and relapse had followed six months later. The patient was very stout. Operation January 31, 1895. The sac was very adherent to former cicatrix, and omentum was adherent to sac. The adhesions were separated or tied off with catgut and the entire sac removed. The peritoneum fascia and skin were then closed in three layers, kangaroo tendon being used for the buried sutures and silkworm gut for the skin. On account of the thick layer of fat, the

superficial portion of wound was packed with iodoform gauze (according to Gersuny's method), which was allowed to remain forty-eight hours, and on removal, the sutures of silkworm gut were tied. Primary union followed. Final result, sound January 23, 1895.

No. 184.—P. L., male, aged seven years. Right inguinal hernia since infancy. The hernia was the size of an orange and was congenital, as shown by operation. Truss had been worn constantly without benefit. Operation November 25, 1894. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Final result, perfectly sound January 3, 1895.

Nos. 185 and 186.—T. D., male, aged five and a half years. Double inguinal hernia of four and a half years' duration. Not improved by truss treatment. Operation December 7, 1894, Hospital for Ruptured and Crippled. Bassini's method, both sides; kangaroo tendon was used for buried sutures, catgut for skin. No drainage. Primary union followed. Final result, sound January 22, 1895.

No. 187.—J. M., male, aged twenty-three months. Right inguinal hernia, strangulated. No hernia had been observed until twenty-four hours previous to coming to the hospital. The supposed cause was a fall upon a chair. The hernia had been strangulated for five hours, and taxis had been thoroughly tried before the child was brought to the hospital. Taxis was again tried under chloroform preparation for operation, having first been made in case taxis failed. The ring was exceedingly tight, and none of the contents of sac could be forced back, even when thoroughly relaxed by the anæsthesia. Operation was then performed December 7, 1894. The constriction was due to the tight, small, external ring rather than the neck of the sac. The bowel was returned, and the wound closed by the Bassini method, without drainage, using kangaroo tendon for the buried sutures. The wound healed by perfect primary union, and the infant was sent home at the end of one week. Final result, perfectly sound January 22, 1895.

No. 188.—M. C., male, aged twelve years. Right inguinal hernia of two years' duration, without improvement from mechanical treatment. Operation January 11, 1895. Bassini's method; kangaroo tendon for buried sutures, catgut for the skin. No drainage. Final result, slight stitch-hole abscess occurred and the patient is under treatment January 23, 1895. Sinus healed within a few days. Perfect February 13, 1895.

No. 189.—A. J., female, aged twenty years. Right oblique

inguinal hernia, complicated with hydrocele of canal of Nuck. There was a history of tumor in groin for one year, size of a hen's egg. Never entirely reducible. Operation December 13, 1894, Post-Graduate Hospital. The hydrocele sac did not communicate with hernial sac. The hydrocelé sac was excised. The hernial sac was ligated high up, and the canal closed by Bassini's method. Kangaroo tendon for buried sutures, catgut for skin. No drainage. Perfect primary union. No relapse, January 15, 1895.

No. 190.—E. W., female, aged thirty-eight years. Right inguinal hernia of one year's duration. It was of traumatic origin, and was the size of an orange. Operation December 13, 1894. Bassini's method; kangaroo tendon was used for buried sutures, catgut for the skin. No drainage. Perfect primary union followed. Final result, sound January 16, 1895.

No. 191.—S. S., female, aged twenty-two years. Right femoral hernia of several years' duration. Operation December 17, 1894. High ligation of sac and closure of crural canal with buried sutures of kangaroo tendon. Perfect primary union. Final result, perfect January 15, 1895.

No. 192.—J. S., female, aged eleven years. Left inguinal hernia of two years' duration. No improvement had followed mechanical treatment. Operation January 18, 1895, at the Hospital for Ruptured and Crippled. Bassini's method; kangaroo tendon was used for the buried sutures, catgut for the skin. No drainage. Primary union followed. Final result, sound March 1, 1895.

No. 193.—J. D., male, aged four years and three months. Double inguinal hernia, which had existed since seven weeks old. He had been treated at the Hospital for Ruptured and Crippled two and a half years without improvement. Operation, right side, January 18, 1895. Bassini's method; kangaroo tendon for the buried sutures, catgut for the skin. No drainage. Perfect primary union. Under treatment January 23, 1895.

Nos. 194 and 195.—A. C., male, aged thirty-six years. Double direct inguinal hernia of two years' duration, coming on after heavy lifting. The hernia on the left side was the size of an orange, and on the right side, of a goose-egg. Operation January, 1895, Post-Graduate Hospital; double Bassini. The ring on both sides was very large, and admitted three fingers. The herniæ were typically direct, and dissection showed the epigastric vessels plainly to the outer side of the hernial orifice. The sac occupied a position posterior to the

cord instead of the usual anterior position seen in the oblique or ordinary form of hernia. Kangaroo tendon was used for the buried sutures, and no drainage employed. Primary union followed.

No. 196.—B. B., female, aged twenty-six years. Right femoral hernia of uncertain duration, probably about one year. It had been irreducible and attended with considerable pain for one week. Examination before operation showed a small mass about the size of an English walnut in the right femoral region. It could not be reduced, and was somewhat tender. The diagnosis of irreducible omentum or of a small mass of extraperitoneal fat was made. Operation January 24, 1895, Post-Graduate Hospital. The tumor that had been felt was found to consist partly of a mass of extraperitoneal fat (common in femoral hernia) and partly of fluid in the hernial sac. The fluid and pain were doubtless due to a portion of omentum that had been temporarily imprisoned in the sac, and afterwards released. The sac was ligated high up, and the canal closed by interrupted sutures of kangaroo tendon. No drainage. Primary union followed.

No. 197.—A. G., aged five years. Right inguinal hernia, which had existed since infancy. A truss had been worn the entire time without improvement. The hernia was very large and complicated with fluid in the hernial sac. Operation February 1, 1895. Bassini's method; kangaroo tendon; no drainage; primary union.

No. 198.—W. S., male, aged eighteen years. Left inguinal hernia of several years' duration. Three weeks before he noticed a hard mass above the testis that could not be reduced into the abdomen. It was somewhat tender and increased some in size. Examination at the time of operation showed a tumor the size of an English walnut between the testis and external ring entirely distinct from testis, but intimately connected with the cord. Inasmuch as he had had a hernia for a considerable time, and associated the appearance of the tumor with overlifting, a probable diagnosis of an irreducible, inflamed omentum was made. Operation February 7, 1895, at the Post-Graduate Hospital, showed the tumor to be made up of several small cysts, with very thick walls, one-fourth to one-half inch. It had apparently originated in the lower end of the sac, and later became adherent to the cord. The cord at first seemed to pass directly through the mass, but by very slow and careful dissection it was found possible to separate them without injury to the vas or the vessels of the cord. The tumor along with the hernial sac, which was ligated beyond the internal rings, were removed, and the canal closed as usual

by the Bassini method, using kangaroo tendon for the buried sutures, and catgut for the skin suture. No drainage was employed, notwithstanding the extensive dissection. Primary union followed.

Microscopical examination of the tumor showed it to be simply cystic in character with dense walls of connective tissue. No evidence of malignant or tubercular trouble was found.

No. 199.—P. F., male, aged twenty-six years; German. Right inguinal hernia of three years' duration. Operation February 8, 1895, Post-Graduate Hospital. Bassini's method, with kangaroo tendon for the buried sutures and catgut for the skin. No drainage. Perfect primary union followed.

No. 200.—W. S., male, aged 17 years. Double oblique inguinal hernia of three years' duration; very small on right side; size of orange on left. Operation February 13, 1895. Bassini's method with kangaroo tendon for buried sutures and catgut for the skin. No drainage. Slight pneumonia following ether. Perfect primary union. Two and a half weeks in the hospital.

A STUDY OF THIRTY-NINE CASES OF STRANGULATED HERNIA.¹

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DURING the past ten years I have seen in consultation or among my own patients thirty-nine cases of *true* strangulated hernia, of which notes have been kept, and a brief detailed report of which accompanies this summary.

I use the term "true strangulated hernia" as indicating the exclusion of all cases of temporary incarceration without intestinal obstruction, as well as numerous cases of incarcerated and inflamed omentum which have been seen during the same period. Nor does it include a large number of infants which have been brought to me, both at my clinic and privately, whose hernias have only been strangulated for brief periods, regarding which notes have not been kept.

It must be borne in mind that these case-histories began ten years ago, and cover a period in which there has been the most wonderful advance in general as well as special surgery. Consequently, in the earlier operations here reported are recorded what we now recognize as gross errors, especially in details which have bearing upon the subsequent permanent cure of the case. In these, however, I was only following the surgery of that day. I refer to such details as returning the omentum to the abdomen instead of amputating it, to opening to the external ring only instead of fully exposing, and examining the internal ring and removing all foreign bodies from the canal. Also to

¹ Read before the Medical Society of the State of New York, Albany, February 5, 1895.

the material used for sutures which were dissolved in a few weeks at the most, leaving the patient as poorly protected as before the operation.

A very brief summary of these cases may be given as follows:

Twenty-six males and thirteen females, whose ages range all the way from seven months to eighty years of age. Twenty-nine had inguinal, eight had femoral, and two had umbilical hernia.

In twenty-two instances the hernias were reduced without operation. Ether was given seventeen times, chloroform six, while two were operated upon after injecting the vicinity of the tumor with a 4-per-cent. solution of cocaine. Of the entire number three died.

I wish first to draw your attention to those hernias reduced without operation, as I believe that their proportion is in excess of the usual number so relieved, and that the methods of handling them were different in some respects from those ordinarily adopted.

The word "taxis" does not carry with it any very definite meaning, and the manner in which it is generally executed is even more uncertain than the definitions which are to be found in the dictionaries.

I have therefore been inclined to drop the word in the following reports, and use a term instead that indicates the method used. That the method has merit over those in ordinary use is indicated by the fact that of the twenty-two hernias reduced, sixteen cases had been worked with by twenty-five physicians before I saw them, and only six made direct application to me.

I desire to describe, briefly, this method of reducing strangulated hernia, as followed by me for many years. It is referred to in the following case-histories as "traction" and "compression."

Try at the outset to assure your patient that you are not going to add to his torture, and confirm this in his mind by handling the tumor with the greatest gentleness. By this you will secure his co-operation instead of unconscious resistance.

Place him on a table with the hips well elevated instead of working over a soft and yielding bed. An ordinary kitchen-table, with the legs at one end elevated six or seven inches, answers every purpose, and is obtainable in almost every house.

When the patient is in place, first gently crowd the entire abdominal contents away from the lower abdomen towards the chest, then work the fingers of one hand around the neck of the tumor where it issues from the abdomen, holding its bulk in the palm of the hand, if possible, and, instead of trying to push the tumor back into the abdomen, try to draw it farther down. Now, with the other hand, grasp the canal with its contents (if inguinal hernia) gently but firmly between the thumb and fingers, and, while making traction and compression with the hand that is holding the tumor, manipulate the canal with a "kneading" motion. This can be done without adding to the patient's pain to any extent, and it will succeed when more rude handling fails.

When you push upward on a strangulated hernia, usually you carry it up over the edge of the ring upon the abdominal wall, and accomplish nothing more. In the method suggested, by traction you lengthen out the mass that is blockading the canal, favoring the effect which you afterwards produce by compression,—*i.e.*, the partial emptying of engorged blood-vessels, the displacement of imprisoned gases and fluids. This is further aided by the action of the fingers upon the canal, which tend to work the bowel free at the point of constriction.

Shall we give anæsthetics as an aid in the reduction of hernia?

More lives are lost than saved by giving them for the express purpose of reducing a strangulated hernia. Remember that but one point is gained, and that a dangerous one, the insensibility of the patient.

Give the anæsthetic only when you are all ready to operate, and then bear in mind that great force is far more dangerous than an operation. With children it is an important aid as it removes the element of fear.

Internal remedies are worse than useless, as they lead to the belief that something is being done, while, in reality, valuable

time is being wasted. External remedies have been, with me, limited to the use of ice, and I have seen very beneficial effects from its application when the tumor contained large masses of inflamed omentum.

The hypodermic syringe is a blessing to the sufferer while awaiting the preparations for an operation, or the arrival of the operator, but it has deluded more than one physician and patient, until death claimed its victim.

It has no place in the treatment of strangulated hernia other than to palliate suffering.

Aspiration was resorted to only once in this series of cases, and it is not approved of as an aid in reduction.

The youngest child that it was found necessary to operate upon was thirteen years of age. The method of reduction referred to, carried out with extreme gentleness, while the child was under the influence of chloroform, has been attended with success in every instance, in infants and children under this age.

In the case-notes will be found mention of the occurrence of bloody evacuations after the reduction of strangulated bowel, as common in infants. This has also been noted in two or three cases of adults.

Of the seventeen operations seven were upon men, and ten upon women, only three reductions without operation being accomplished among the latter.

I wish to call special attention to the operation on old people. Two at seventy-five, one at seventy-six, one at seventy-seven, and one at eighty, nearly all delayed or complicated cases, and yet all recovered promptly.

The three fatal cases are all believed to be chargeable to delayed operation. The first was that of a 300-pound woman who had suffered ten days from intestinal obstruction before I saw her. Her condition was not supposed to be connected in any way with an old irreducible umbilical hernia. There was no change in this, but the intended laparotomy was begun at this point. Nothing was found in the enormous hernial sac except adherent omentum, but inside the abdomen was found a loop of bowel passing through an opening in this omental apron.

The bowel was folded upon itself at such an acute angle that nothing could pass through it, and still its circulation had not been so far impeded as to destroy its vitality. The opening in the omentum was enlarged to prevent the possibility of recurrence.

Before the woman was taken from the table she had an involuntary evacuation, followed by others later in the day and on the following day. After that, intestinal obstruction gradually recurred, and she died ten days later.

It is believed that this woman died from paralysis of the loop of bowel that had been under pressure.

The second case was beyond question lost by neglect. A young man, twenty-three years old, with a history of a reducible scrotal hernia, was taken violently ill. Four local physicians spent six days wrangling over a diagnosis, and when I saw him he had general peritonitis well developed. An operation removed a large mass of sloughing omentum, and released the bowel, but he died five days later from peritonitis.

The third case was a woman sixty years old, with an enormous umbilical hernia strangulated ten days, and in collapse at the time of operation. She died at the end of one week from exhaustion.

All three could in all probability have been saved by prompt surgical means.

At the present day it is almost criminal for a medical man, who will not operate himself in cases of this character, not to call in promptly some one that will.

Many things of interest, and we believe of importance, will be found in the case-histories that cannot be mentioned in the brief time at my disposal, but there are none believed to be of more importance than the use of hot water, and its effect upon damaged bowel, as it has been carried out in a number of the cases. Its effect is almost magical, and the rapidity with which it re-establishes the circulation and restores normal color is a surprise to those who witness it for the first time.

I cannot too strongly urge the adoption of this simple means. I feel certain that in some of these cases resection would have

been considered necessary by the enthusiastic advocates of the various methods, and I am sure that the cases would have given me far greater concern if I had not been able to demonstrate the vitality of the bowel before returning it to the abdomen.

CONCLUSIONS.

- (1) Prompt operation saves complications and life.
- (2) Infants seldom require operation.
- (3) Medicines and external applications are dangerous, as their use causes delay.
- (4) Operations done early are neither difficult nor dangerous.
- (5) Rough handling is more dangerous than an operation.
- (6) Morphia masks symptoms, but does not stop destructive changes.
- (7) Local symptoms are misleading.
- (8) Hot water saves resection, or furnishes prompt evidence of its necessity.
- (9) Operate rather than attempt the reduction of a hernia acutely strangulated for twenty-four hours.
- (10) Open to internal ring in every instance.
- (11) Always draw the bowel down far enough to examine the actual point of constriction.
- (12) It is not considered good practice to give cathartics after strangulation and the return of suspicious bowel.

CASE I.—September 20, 1884. J. G., farmer, aged fifty-eight years, has had right scrotal hernia for many years. Never had symptoms of strangulated hernia before. Present attack began thirty-six hours before. Vomiting, intestinal obstruction, and intense pain. Scrotum on right side hard and hot; skin a dark red color, and the tumor is about the size of a goose-egg. Attempts at reduction have been made.

Operation at house of patient, assisted by Drs. Swift and Miller.

Constriction at external ring. Sac found to contain about one ounce of dark-colored fluid. Gut was quite dark, but regained its color rapidly when constriction was removed. Was returned to abdomen with difficulty owing to distention with gas.

Sac was not removed, and the external ring was brought together by heavy catgut. Wound closed partly by granulation, and the man was out the fourth week following the operation. No truss was worn, and recurrence of the hernia occurred within six months.

CASE II.—May 8, 1886. Miss S., aged seventy-five years. As first seen, she had a tumor at the navel and one in the femoral space, both irreducible. She could not tell whether either had ever been reducible. There was vomiting, complete intestinal obstruction, great distress and shock, but no local symptoms directed towards either tumor.

Morphine had been freely given hypodermically. She had a weak, irregular heart and severe bronchitis.

Duration of attack, forty-eight hours; shock marked. Ether was given, and under it heart-action improved, Drs. Swift and Miller assisting. The femoral hernia was cut down upon, and on opening the sac a small amount of fluid and a knuckle of gut, very dark in color, were found. The constriction at Gimbernat's ligament was cut, and the damaged bowel brought down. There was great doubt as to the advisability of returning the bowel to the abdomen, and it was thought best to try the effect of hot water. Hot cloths were applied for twenty minutes or more with the most remarkably beneficial effect. The bowel, which seemed lifeless and black, gradually changed to a chocolate, and then to a lighter color. Gut returned to abdomen and parts closed without attempt at radical cure. She made a prompt recovery, and died at eighty years of age from other causes.

CASE III.—January 22, 1887. J. A., milkman, aged thirty-eight years. When this man first came under observation, one year before the date of the case, he was suffering from what had been for many years an irreducible omental hernia. After several attempts by manipulation, this was converted into reducible hernia, and a truss applied.

The hernia was well retained, but, under the belief that he was cured, he became very careless, and at times left his truss off. On one of these mornings he jumped from his wagon, the hernia came down, and he at once developed acute symptoms of strangulation.

This was at six o'clock in the morning, and at eleven o'clock the same forenoon, assisted by Drs. Thos. Stone and M. H. Williams, I operated.

Stricture at the external ring. Gut in good condition. A large mass of omentum returned to the abdomen and parts closed by catgut.

It was known that this man's urine was loaded with sugar, showing a specific gravity of 1040, and some concern was felt as to the possible effects of the operation upon him, but he made a prompt and perfect recovery.

His hernia recurred within six months, and became much more troublesome than before the operation, and while he has not up to the present writing had a return of symptoms of strangulation, he is constantly troubled by his inability to secure a truss that will perfectly and comfortably retain his hernia.

CASE IV.—December 31, 1887. Mrs. E. G., aged sixty years. I was asked on this date, by telegram, to see a case of intestinal obstruction. I found that the patient, an enormously fat woman, weighing over 300 pounds, had not had a faecal evacuation for over one week. The trouble began even earlier by obstinate constipation, arriving gradually at complete obstruction. For the past three days she had been vomiting. She had not suffered extreme pain, nor did she seem in a dangerous condition.

Further investigation revealed the fact that she had had an irreducible umbilical hernia, but I was assured by herself and husband that the condition of this was in no way changed from that in which it was before the present attack. Examination of the tumor did not aid in making a diagnosis, as no tenderness or unusual hardness was present. A long rectal tube was passed, and a large enema, consisting of first a quart of olive oil, followed by a very large quantity of warm water, was given without effect. An operation was advised but declined.

Two days later, however, I was asked to operate. Assisted by Drs. Swift, Kingsley, and Fanning, I began my intended laparotomy by exploring the region of the umbilical hernia.

Upon opening the hernial sac I found a large quantity of adherent but healthy-looking omentum, and found that it was not constricted at the umbilical opening. On passing my finger through this opening, as I could readily do, I felt a hard, round tumor. Owing to the enormous deposit of adipose tissue over the muscular wall, fully three inches thick, I was obliged to enlarge the umbilical opening considerably in order to bring the tumor where it could be inspected. This having been done, it was found that a small loop of intestine had passed through a break in the apron of omentum which was attached outside of the abdomen.

About four to six inches of the gut were involved, and while it

was bent upon itself in such a way as to prevent the passage of anything through its lumen, it was not constricted so tightly as to stop the circulation of blood through the intestine. It looked a little blue, but not the least damaged by its imprisonment. The opening in the omentum was so enlarged as to prevent the possibility of strangulating another loop of bowel, and the parts were closed without any attempt to remove or replace the omentum adherent outside the abdominal wall.

Before the woman was taken from the table she had a large, involuntary, faecal evacuation, and shortly after recovering from the ether, another.

On the following day she had a slight movement, and expressed great relief over her former condition. On the fourth day following the operation an attempt to move her bowels failed, and gradually all symptoms of obstruction recurred, and she died on the tenth day after the operation.

She had as before little pain. Further surgical interference was declined, nor was it possible to obtain an autopsy.

The cause of recurrence of symptoms and final death of the patient was for a number of years a great source of perplexity to me; but since I have given considerable thought and study of paralysis of the intestine from pressure, I have concluded that this may have been the actual condition in this case, and that her death was finally due to paralysis of the intestine, either of the loop confined or above this point from over-distention.

CASE V.—January 10, 1888. Capt. R., naval officer, aged forty-five years. Had a right scrotal hernia, which was usually retained by his truss. His truss had broken, and he had been careless in having it repaired. He was suddenly taken with severe pain in the vicinity of the umbilicus, and discovered that his hernia was down and could not be reduced. I saw him ten hours after the beginning of the attack. Ether had been given by the ship surgeon, but all attempts at reduction had failed. He had vomited several times, and pain was severe.

After about twenty minutes' work the hernia was reduced without anæsthesia. Reduction was accomplished by drawing down the tumor so as to lengthen out the neck. It was then compressed in the hand while its neck was kept small. A suitable truss was applied, and he has had no similar trouble since.

CASE VI.—January 30, 1888. G. H., grocer, aged thirty-eight

years. Patient had an enormous left scrotal hernia, which had ordinarily been easily reducible. Was seen about six hours after strangulation began, and attempts at reduction failed. He was vomiting, and had considerable, but not extreme pain in upper part of abdomen. Operation was advised but positively declined.

An ice-bag was applied to the tumor, and on the following morning, twenty-four hours after the beginning of the attack, it was reduced by taxis.

It is believed that the evidently beneficial effect of the ice was largely due to the fact that the tumor contained a large quantity of omentum. The constriction of the blood-vessels in this mass might easily have relieved the blockade.

CASE VII.—February 15, 1888. Mrs. G. J., aged thirty-seven; shop-woman. Had left inguinal hernia larger than one's fist for several years. Has not worn a truss, and never had trouble before. Present attack of four hours' duration, and violent in character. Vomiting extreme and great depression. Family physician had worked with her for a long time, but failed to reduce the tumor. Reduced in twenty minutes, without ether, by drawing tumor down and using compression.

CASE VIII.—September 28, 1888. S. D., livery man, aged thirty-six years. Has been under my care for mechanical treatment for two years for right scrotal hernia. Went about his house with truss off, and hernia became strangulated. Was seen five hours later, and found with all the symptoms of strangulated hernia.

Hernia reduced after about half an hour's manipulation without anæsthetic.

CASE IX.—October 7, 1888. M. J., farmer, aged fifty-five years. Had right strangulated scrotal hernia for thirty-four hours when first seen by me. His attending physician had made several unsuccessful attempts at reduction. Anæsthesia had been resorted to, cathartics had been given, injections used, and hypodermics to relieve suffering. Vomiting and shock were prominent symptoms. On the night before I saw him, ice had been applied and kept on.

Further attempts at reduction by taxis were deemed inadvisable, and he was prepared at once for an operation.

When fully under the ether, and while gently handling the tumor, reduction suddenly occurred. It was thought that perforation of the bowel might occur later, and everything was in readiness for an operation for this, but the man made a prompt recovery. The

tumor was a little larger than a hen's egg, and the contents apparently intestine only.

CASE X.—January 10, 1889. D. M. P., mechanic, aged forty-five years. Left scrotal hernia strangulated ten hours. Vomiting, severe pain, and considerable shock. Attending physician had made several attempts to reduce the tumor. Reduced by traction and compression in twenty minutes without anæsthetic.

CASE XI.—September 4, 1889. D. J., farmer, aged twenty-three years. Had history of scrotal tumor for several years. Five days before being seen by myself he was taken violently ill. Family physician believed that he had strangulated hernia, but a brother physician in the same town, who was called in, made a diagnosis of orchitis, and a third differed from both, and believed it an inflamed omental protrusion.

When I saw him general peritonitis was well established, and the young man was rapidly going into a state of collapse. Immediate operation was advised as a forlorn hope, and consented to.

When the sac was opened it was found to contain a mass of sloughing omentum, a quantity of ill-smelling, dirty fluid, and about six inches of deeply-congested small intestine.

The omentum was brought down, and amputated through comparatively normal tissue, and the gut, after being treated by hot cloths for about twenty minutes, was considered in a suitable condition to return to the abdomen.

The general peritonitis went on, however, and the man died on the fifth day after the operation.

CASE XII.—March 4, 1890. M. A. O'N., aged seventy-five years. Dr. Thomas Stone asked me to see this patient, who had been suffering from acute symptoms of strangulated hernia for thirty hours. All attempts at reduction had proven unavailing, and the woman was rapidly passing into a state of collapse. I found her in extreme pain, vomiting frequently, and looking as though she might die at any time, and a hard tumor the size of a hen's egg in the left femoral space.

The woman and her daughter lived, ate, and slept in the same seven-by-nine room, and only one small lamp could be obtained to furnish light. More unfavorable surroundings could scarcely be imagined. It was with difficulty that a small amount of hot water could be obtained. The case being desperate, ether was at once given by Dr. Stone, and the condition of the woman was such that

with a few breaths she was sufficiently anæsthetized to allow of the incision being made. The sac was opened at once, and a small amount of brown fluid escaped. The contents consisted of a small mass of omentum and a knuckle of gut, both in very bad condition. After cutting the constriction at Gimbernat's ligament, the omentum was brought down and ligated with silk, at a point high enough to insure normal omental tissue. The intestine was very black, but after removing the constricting band, and the repeated application of hot sponges, it began to regain its normal color, and was deemed safe to return to the abdomen. The sac was dissected out, and the canal closed by silk. The woman rallied well on the following day, and within ten days was entirely well, perfect primary union having taken place. A light truss was worn from choice for a time, and no recurrence of hernia since.

CASE XIII.—March 10, 1890. I. S., hotel-keeper, aged fifty-two years. Well advanced in phthisis. Strangulated right complete inguinal hernia the size of hen's egg. Duration of present attack twelve hours. Vomiting during last three hours. Severe colicky pains across abdomen on line with navel. Four physicians had previously seen the case and failed to reduce the tumor. Anæsthetics had not been employed. Tumor reduced after thirty minutes' manipulation. The man had been operated upon for strangulated hernia one year previously.

CASE XIV.—July 26, 1890. Mrs. L., aged sixty years. Has had an enormous umbilical irreducible hernia for years. Had worn no support. Eight days since was taken with severe abdominal pains, and shortly after vomiting occurred. Intestinal obstruction has been complete from the beginning of the attack. The tumor is as large as the patient's head, hard, hot, and dark in color. Attempts at reduction have been made by three or four physicians. The woman was in partial collapse and appeared moribund.

At the first incision a quantity of putrid fluid spurted to the ceiling of the room in which the operation was done. The sac was full of sloughing omentum, which was amputated. The intestine was dark in color, but apparently not badly damaged, and after treatment with hot water was considered suitable to return to the abdomen. The woman died one week later, never having rallied from the condition of collapse, which had existed before the operation.

CASE XV.—July 30, 1890. N. B., school-boy, aged twelve years. Has had scrotal hernia on right side for several years, but has never

worn a truss. Hernia strangulated for twelve hours. Vomiting and abdominal pain. Taxis under ether had previously failed, but just before beginning the operation the tumor slipped back into the abdomen.

CASE XVI.—December 21, 1890. Miss K. D., shop-girl, aged thirty-six years. Has had left femoral hernia for many years, without any previous trouble in reducing it. Seen in consultation with her family physician five hours after the beginning of the attack. Attempts at reduction proved unsuccessful, and ice was applied while preparations for an operation were made. After the ice had been on two hours, the tumor was easily reduced by manipulation.

CASE XVII.—January 31, 1891. F. B., aged five years. Large right scrotal hernia since birth; strangulated, with acute symptoms for fourteen hours. Three physicians had tried taxis and failed. Reduced after chloroform had been given, and all preparations for an operation made.

CASE XVIII.—February 10, 1891. A. C. V., infant, aged nine months. Had double inguinal hernia, both sides very hard to retain. Brought to my office very late at night, with left scrotal hernia, strangulated for three hours. Child was violently ill, and had vomited frequently. Chloroform was given, and tumor was reduced after nearly half an hour's careful work. Blood was passed with two or three subsequent movements, but the child recovered promptly.

CASE XIX.—March 3, 1891. W. R., aged four years. Had been under mechanical treatment one year. Parents thought the child cured, and removed the truss. Brought to me with right scrotal hernia strangulated for four hours. Two physicians had attempted to reduce it but had failed. Chloroform was given, and the tumor was reduced in twenty minutes. Truss reapplied, and two years later all support was removed, and the child has remained cured to this date.

CASE XX.—March 4, 1891. Miss S. W. T., aged eighty years. Had been under my care for a number of years for the treatment of an enormous right femoral hernia. It was impossible to retain the hernia completely, with any form of truss that she would tolerate.

On three previous occasions, during a period covering five or six years, I had been called upon to relieve her of the incarceration of her hernia. Once she reduced it herself before my arrival, and twice I accomplished it without great trouble.

On all occasions the pain was extreme. Careful manipulation

failed entirely in this instance. The tumor was as large as the patient's head, and extended around the inner aspect of the thigh to very nearly its back. The condition of shock was marked, but vomiting had not yet occurred.

Some members of the family wished the operation deferred until the following day, but the patient not only consented to but wished it immediately, as advised by myself. It was therefore done in the middle of the night by a single and not over-large gas-flame, Drs. Roome and Macy assisting. About four hours had elapsed since the beginning of the attack. Upon opening the sac, about eighteen inches of deeply-congested small intestine were found contained in it. The constriction was at Gimbernat's ligament, and was at once removed. The intestine was then gently drawn down to allow of the examination of the point which had been subjected to pressure. Cloths wrung out of hot water were then applied to the gut until its normal color was partially restored. It was then with some difficulty reduced to the abdomen. No attempt was made to dissect out the enormous hernial sac, which extended down about eight inches below the femoral opening, and half-way around the thigh. It was divided at its neck, where it was tied off with heavy silk, and the stump reduced well within the abdominal cavity. The ends of the silk ligature surrounding the stump of the sac were left long, and one end was carried up through Poupart's ligament, while the other was carried down into the pubic portion of the fascia lata. Two other silk sutures of this character were applied, practically closing the femoral canal.

The patient rallied well after the operation, and the wound closed completely by primary union. The bowels did not move for five days after the operation, but as there was no pain, no symptoms of continued obstruction, it was considered best to allow them to remain quiet, in view of the suspicious character of the loop, which had been subjected to pressure.

Recovery was in every way prompt and complete. She has never worn a truss, and is still going about without any indications of recurrence, which fact is noteworthy, considering her extreme age.

CASE XXI.—April 28, 1891. Mrs. D., aged thirty years. Had right femoral hernia for several years, which had been controlled by a truss.

When first seen, she had had strangulated hernia for forty-eight

hours. Taxis had been tried by two physicians. The tumor was the size of a large hen's egg, and very hard. Intestinal obstruction complete. Ether was given at once, and assisted by Drs. Kingsley and Birch, the operation began.

The sac contained, besides dark-colored fluid, a loop of small intestine that was very dark in color, and in a doubtful condition. The constriction was apparently in the neck of the sac immediately below Poupart's ligament. The bowel was treated with hot water until it showed a decided evidence of return to normal color, and was then reduced to the abdomen. The neck of the sac was tied off with silk, and the femoral opening closed with the same material. She rallied well after the operation. On the third day there was a bloody discharge from the bowels, followed for ten days by an obstinate diarrhœa, frequently tinged with blood. The wound suppurated, and the stitches were lost. She was in bed three weeks, but regained perfect health. There was recurrence of the hernia in four months, which has been easily controlled by a light truss.

CASE XXII.—July 15, 1891. S. D. J., mechanic, aged thirty-six years. Has had right scrotal hernia for ten or more years. Had one previous attack of strangulation reduced by his physician. Seen in present attack about two hours after its beginning. Pain extreme; no vomiting; anxious face. Tumor reduced by manipulation in about fifteen minutes.

CASE XXIII.—September 5, 1891. Mrs. R., an Italian woman, aged forty years. Had strangulated left inguinal hernia for twenty hours. Two physicians had at different times attempted the reduction of the tumor. One had given ether. Tumor reduced within half an hour without anæsthetic.

CASE XXIV.—September 10, 1891. P. D. S., school-boy, aged eight years. Left scrotal hernia, size of fist, strangulated twelve hours. Chloroform had been given and taxis tried. All preparations were made for operation. Chloroform again administered by Dr. Stone. Hernia reduced by manipulation. After reduction of the hernia, the boy collapsed from the effects of the chloroform, which had been very carefully administered. Restored by inversion and artificial respiration.

CASE XXV.—October 31, 1891. W. H., lawyer, aged forty-four years. Right scrotal hernia, strangulated five hours. Extreme pain, evidence of shock, but no vomiting. Attempts at reduction had been made by two physicians. Reduction by manipulation in about twenty minutes.

CASE XXVI.—December 3, 1891. J. J. McG., retired merchant, aged sixty-five years. Left inguinal hernia of many years' duration. Strangulated five hours when first seen. Extreme pain and nausea, but no vomiting. Tumor reduced by manipulation in about half an hour.

CASE XXVII.—April 26, 1892. Mrs. T. W. N., wife of a physician, aged thirty-five years. Right femoral hernia size of hen's egg, strangulated twenty-four hours. Pain severe, vomiting constant and of fecal odor. Taxis had been thoroughly tried.

Assisted by patient's husband and Dr. Barker, operation was begun at once and without further attempts at reduction.

Besides a small amount of dark fluid, the sac contained about three inches of deeply-congested small intestine and a small piece of inflamed omentum. The constricting band was at Gimbernat's ligament. After dividing this, both the bowel and omentum were gently brought down, the former for examination and treatment, and the latter for amputation above the line of constriction.

The omentum was tied off with silk and the stump returned to the abdomen.

The bowel was treated with hot cloths for about ten minutes and then returned. Neck of the sac tied off with silk and femoral opening closed. Recovery was prompt and without event. From choice, the patient still wears a light truss, although there is no evidence of recurrence.

CASE XXVIII.—April 29, 1892. A. C., infant boy, aged seven months, with large scrotal hernia since birth. Had been retained by a truss part of the time. Had suffered from strangulation seven hours when seen. Face white and drawn, constantly crying, evidently in agonizing pain. Had vomited once or twice. Chloroform given and hernia reduced in about ten minutes; careful manipulation. Several subsequent movements of the bowels contained blood, but the child recovered promptly.

CASE XXIX.—August 30, 1893. G. M. S., clerk, aged thirty-six years. About one year before the date of this history this man came under my care for mechanical treatment for a large and previously-neglected scrotal hernia. After considerable trouble it was brought under control, and the man passed from my observation. Recently he had become careless about wearing his truss in the house, as the hernia seldom protruded. Ten days ago, while without his truss, the hernia came down to nearly its original size; he became sick and had quite

severe abdominal pains, and found that he could not reduce his hernia. I saw him on the following day. He had vomited once, but the symptoms were not severe.

In manipulating the tumor, I distinctly felt a portion go back into the abdomen, but the balance, and by far the greater portion, could not be reduced.

As he expressed himself relieved of the most urgent symptoms, and feeling quite certain that no more intestine remained in the tumor, ice was ordered, and he was not seen until the following day.

Attempts then, and on three succeeding days, failed entirely to reduce the tumor in size. All indications of the involvement of the bowel had left him, and while the tumor was hot, hard, and sensitive to pressure it was not painful at other times.

He was informed that his choice was now between recovery with an irreducible hernia for life and an operation which would probably result in a complete cure. After a few days' consideration he consented to the latter alternative.

He was placed in the Post-Graduate Hospital and an operation performed. When the sac was opened, about ten ounces of a coffee-colored fluid and some broken-down tissue escaped. A large mass of inflamed and very dark-colored omentum, firmly adherent to the interior of the sac, was found.

When loosened, it was found that hardening extended inside the abdomen, and under gentle traction an equally large mass was brought from the abdominal cavity. Normal tissue was thus reached through which to amputate it.

About twenty heavy silk ligatures were used in tying off the omental mass.

The neck of the sac was tied by silk and cut off, the fundus being allowed to remain in the scrotum. The canal was closed by the Barker method, which I was using at that time. There was some abdominal pain for four or five days, due more to the inflation of the bowels with gas than to any inflammatory action.

He made a prompt and in every way satisfactory recovery, with a small sinus which remained open for five or six months. This gave him so little trouble, however, that he would not allow of the opening of the parts to find the offending stitch. It eventually closed without the loss of stitch.

As the patient was a very heavy man, a light truss was applied, and is still worn, although there is no indication of recurrence.

CASE XXX.—November 17, 1893. Mrs. M. R., aged thirty-six years. Two weeks ago she had an attack of acute strangulation. I saw the case for Dr. Thomas Stone, who thought that he had reduced a part of the tumor. The urgent symptoms had subsided, but further reduction could not be accomplished, and she refused absolutely to submit to an operation.

Ice was continued. The woman was kept in bed, but the tumor became more troublesome, and ten days from beginning of the attack she consented to an operation, but refused to take an anæsthetic. Cocaine was therefore injected about the tumor, and the incision made without causing much pain.

The sac, which was congested and dark in color, was opened and found to contain about three ounces of a dark-colored fluid, with broken-down tissue and sloughing omentum.

The neck of the sac had been closed off from the abdominal cavity by the inflammatory condition. Free drainage established. The woman recovered promptly. Subsequent history not known.

CASE XXXI.—November 18, 1893. J. K., printer, aged thirty-six years. Had been under my care for the mechanical treatment of an enormous left scrotal hernia for two years. Ordinarily his hernia was retained, but on the occasions of his heavy drinking, it was quite sure to come out. Usually he had been able to reduce it, but this time he could not. He was brought by a fellow-workman, who had great trouble getting him from the car to my door, so great was his suffering. The tumor had been strangulated about two hours, and was only reduced after half an hour's hard work. Instant relief followed.

CASE XXXII.—November 21, 1893. Mr. M., farmer, aged seventy-seven years, has a history of double hernia for many years, and has worn a German truss. Does not know whether hernias have been retained or not.

Five days ago, when about to go aboard boat for Florida, was taken violently sick. Vomiting, severe abdominal pains, but no special pain in either hernia. He went to the house of a friend in the city, and was treated for cholera morbus for three days. Returned to his home, thirty-two miles in the country, on the fourth day, and on the fifth day I was asked, by telegram, to see him by his physician, Dr. Swift, who had at once made a correct diagnosis.

I found him with an irreducible inguinal hernia on the right side, and an irreducible femoral hernia on the left.

There were no positive symptoms pointing towards either side, but on general principles, it was decided to operate on the femoral hernia.

Intestinal obstruction had been complete since beginning of the attack. There was abdominal distention and indications of general peritonitis. Vomiting frequent and of a faecal odor. The patient was in a stupor most of the time when not vomiting. The heart-action was weak and irregular. In view of the circumstances, it was thought best to operate without giving an anæsthetic. A 4-per-cent. solution of cocaine was therefore injected around the tumor, and the incision made without causing any pain.

I had been called to the case when away from home, and had no instruments except a very small pocket case. The surroundings were of the most unfavorable character, the only available light being one small lamp. The silk used for tying the sac and for vessels was from the work-basket of the patient's wife.

When the sac was opened, besides the dark fluid, a loop of small intestine very dark in color was found.

The constriction at Gimbernat's ligament was cut, and the bowel drawn down for thorough examination. There was a distinct line about both parts of the loop which had been under pressure, and much œdema in the coats of the bowel which formed the loop itself. Hot water was applied until the color had begun to change decidedly for the better, and the bowel was then returned to the abdomen.

The sac was closed, but opportunity for drainage was provided for through a part of the wound to favor the formation of a faecal fistula in case of perforation.

The operation had been completed without causing the patient any great amount of pain. This was, perhaps, as much due to the stupor in which he was as to the cocaine which had been injected.

Sharp peritoneal trouble lasted about five days. Bowels moved without cathartic on the fifth day, and he was about the house on the twenty-first day.

The wound had closed promptly and without the least suppuration. Truss has been worn since the operation.

CASE XXXIII.--December 26, 1893. P. O'B., boy, aged two years. Had been treated by truss for one year, and the parents, supposing him cured, removed it. One week later hernia came down and became strangulated. Ten hours elapsed before the child was

brought to me, during which three local physicians attempted to reduce the hernia, one using an anæsthetic.

The child had vomited and was in great pain. Face looked pale and drawn and crying was constant.

My assistant, Dr. Geo. E. Doty, gave chloroform, and the hernia was reduced in about ten minutes by traction and compression. Child recovered promptly.

CASE XXXIV.—January 21, 1894. Mr. LeF., farmer, aged sixty-five years. Large left scrotal hernia for many years, usually retained by a truss.

Became strangulated one week ago. Symptoms urgent at first, but his physician, after twenty-four hours, reduced a portion of the tumor, and soon after his bowels moved. Considerable abdominal pains continue, and the tumor is hard and hot. After about half-an-hour's work the entire mass was returned to the abdomen. Relief almost immediate.

CASE XXXV.—January 11, 1894. G. G., infant boy, aged eight months. Four days previously this child was discovered to be in great distress, and shortly after a hard swelling was found in the right side of the scrotum. It was seen by two physicians who attempted to reduce the tumor. A third who saw it sent the child to clinic at the Post-Graduate Hospital.

Constant vomiting since beginning of the attack and intestinal obstruction complete. Evidences of peritonitis marked, and general appearance of child bad. Chloroform given and reduction accomplished before the class in about five minutes by traction and compression.

The child had an evacuation before leaving the room. Subsequent movements contained considerable blood. Child slept that night for first time in four days, and made a prompt recovery.

CASE XXXVI.—March 27, 1894. Mrs. J. K., farmer's wife, aged sixty-five years. Right femoral hernia, strangulated seventy-two hours. Hernia has existed seven years. Her physician applied a truss, but she would not wear it. Has had several attacks of "colic," which she did not associate with her hernia. Present attack began about three days since by abdominal pain, mostly in side opposite to hernia. Intestinal obstruction was found to be complete, and vomiting soon began. I was asked by her physician to see a case of intestinal obstruction.

Her hernia had not been reducible during past year or more, and

as the pain was not there, she insisted upon her hernia being all right, and had thereby misled her physician.

Immediate operation was prepared for, and on opening the femoral sac, besides the usual coffee-colored fluid, a loop of very deeply-congested bowel was found. Stricture was in the neck of a dense fibrous sac.

The bowel was brought down with great difficulty owing to very tough adhesions. At first sight it was believed to be in such a bad condition that resection would be required, but after nearly half an hour's use of hot water it was so far restored as to warrant its return to the abdomen. The parts were closed in the usual way, and the woman made an uninterrupted recovery. Bloody evacuations were noticed after the bowels moved on the fourth day.

CASE XXXVII.—April 17, 1894. J. D., school-boy, aged thirteen years. Right inguinal congenital hernia, strangulated three days. Had existed since birth, and he had worn no support until one year since, when he was furnished with one at my clinic.

He broke one truss and threw one away to avoid wearing it, but the third one, it is claimed, has been worn constantly for past seven months.

Three days ago his hernia came down and could not be reduced. He had considerable pain, but has not vomited until to-day. The case was seen yesterday and aspirated, about three ounces of bloody fluid being drawn off, but it could not be reduced. The tumor is the size of a small cocoanut. Operation at Post-Graduate Hospital.

Hernial sac found to be thick and tough and containing about four ounces of bloody fluid and a large mass of inflamed omentum.

The omentum was dark in color and congested and hard. It was firmly adherent to the upper part of sac and interior of abdomen in vicinity. Local peritonitis well established. No bowel found involved. All inflamed omentum was brought outside and amputated through normal tissue.

Numerous silk ligatures were used to tie off the omentum, the sac was dissected out, and the canal closed by the method of Bassini.

On the following morning, during a momentary absence of the nurse, the boy got out of bed and ran about the ward. The second night he tore the dressings all off, as he said that they "itched him," but, notwithstanding these incidents, he made a prompt and complete recovery. No truss has been worn, and there is no indication of a recurrence.

CASE XXXVIII.—May 12, 1894. Mrs. M. J. D., aged seventy-six years. Three days before this date I saw this case in consultation with Drs. Griswold and Lyman.

The woman had a history of right inguinal hernia for ten years. She had worn a truss the pad of which pressed over the pubic bone, allowing the hernial contents to occupy the canal constantly. About a week ago she found her hernia painful and irreducible. The symptoms were not violent. Her physician reduced a part of the tumor, but the pains gradually increased.

As found by me, intestinal obstruction had gradually become complete, and the woman was losing strength daily. There was no tumor at the external ring, but higher up and extending towards the median line was a hard tumor the size of one's fist.

A diagnosis of properitoneal or interstitial hernia was made, and an immediate operation advised. It was three days later, however, before the family consented to its performance.

On opening down to the external ring a sac containing fluid only was found. The canal was then split to the internal ring, and here it was found that the sac already opened led into a pocket which extended to the median line. This pocket between the muscular wall and peritoneum contained a mass of small intestine, which was coiled upon itself and adherent to the interior of the sac.

The adhesions were broken up without much trouble, but another mass found just inside the abdomen was so matted together as to defy attempts to free them completely.

Some very troublesome hæmorrhage from the coat of the bowel, in a position that could not be reached by forceps, was finally controlled by hot sponges. All freshened surfaces were dusted with aristol.

The neck of this double sac was tied off, and that part extending down the canal was removed, but no attempt was made to dissect out the portion which extended in front of the peritoneum nearly to the median line and large enough to receive one's hand.

The canal was closed by the method of Bassini. The woman rallied well from the operation, and began at once to improve. On the eighth day a small amount of suppuration was found in the subcutaneous tissues, which was of short duration. She made a slow but complete recovery, and has never worn a truss since the operation. No signs of a recurrence.

CASE XXXIX.—November 29, 1894. W. H., house-painter,

aged twenty-four years. Left inguinal hernia since early childhood. Has never worn a truss. Strangulation five days since. Vomiting began on second day. Intestinal obstruction complete from the first. On the second day an operation was done by the gentleman who called me to the case, a man of experience and ability. He opened down to the external ring, and incised a distended sac (congenital). As the finger could be passed freely into this, he assumed that the hernia had been reduced and closed the parts up.

As all symptoms increased in severity, I was asked three days later to see the patient.

Marked evidence of strangulated intestine was present. The extreme pain was masked somewhat by free hypodermic use of morphia. The man had a dusky skin, was becoming stupid, had a distended abdomen, and a weak heart.

The second operation was begun by extending the old incision up over the internal ring and splitting the canal to this point. The sac was opened also to the internal ring. A knuckle of small intestine was found imprisoned just at the upper end of the canal. As the stricture was divided, the gut dropped back into the abdomen, but by enlarging the opening into the abdomen somewhat and making pressure on the abdominal walls above, it was obtained again and brought outside for inspection.

It was found that while the whole lumen of the bowel had been occluded, its mesenteric attachments had not been under pressure, so that the circulation on this surface had been maintained. The rest of the bowel, representing a surface as large as a silver dollar, was oedematous and very dark in color. Hot water for about fifteen minutes produced the most happy result, and so far restored its color as to warrant its return. The sac was dissected out and the canal closed by the Bassini method.

The man made a very prompt recovery by primary union, and is now going about without a truss.

A PRELIMINARY NOTE ON A NEW METHOD OF
CORRECTING INVETERATE TALIPES VARUS
BY THE ARTIFICIAL PRODUCTION OF
POTT'S FRACTURE DEFORMITY.

By W. BARTON HOPKINS, M.D.,

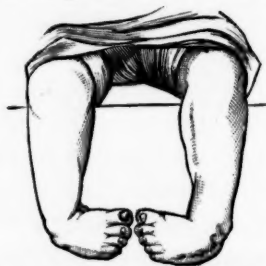
OF PHILADELPHIA.

TWO years ago it occurred to me that a badly-treated Pott's fracture, in a case of talipes varus, would tend to correct the varus. That almost every characteristic of the one had its counterpart in the other. The flat foot, the rotation outward, the strain upon the internal lateral ligament, the outward deflection of the plane of the ankle-joint seen after Pott's fracture, and the exaggerated arch of the foot, the rotation inward, the strain upon the external lateral ligament, and the deflection inward of the plane of the ankle-joint of varus offered an opportunity to obtain a resultant of deformity and injury by artificially causing the deformity which follows fracture of the fibula just above the ankle.

The objections that would naturally appear to such a measure—(1) that a limb so treated would always be functionally weak, because deformity after Pott's fracture is apt to impair the strength of the ankle-joint; (2) that a cure so effected would not be permanent, but that the deformity would relapse after a time on the one hand, or, on the other, that a condition of valgus might ensue from over-correction—are, I think, unfounded.

The weakness in Pott's fracture deformity depends primarily upon the line of weight being directed inside the axis of support, the vertical axis of the leg having lost its normal relation to the foot. The internal lateral ligament of the ankle-joint is consequently strained and the arch of the instep broken down. If, therefore, a foot whose weakness depends upon the line of its superincumbent weight being directed to a point to its outer side,

as in talipes varus, is made to occupy a normal position in relation to the axis of weight, it matters not if the malleolar mortise has been widened and the astragalus somewhat tilted in its socket. Any subsequent tendency to stretching of the internal lateral ligament of the ankle-joint, and to flattening of the exaggerated arch of the foot, would tend still further to open out the inbent tarsus by stretching the contracted ligaments of its inner and lower side and by gradually removing the inward bevel existing in all or some of its articular surfaces. In November, 1892, selecting an inveterate case of talipes varus in a boy of four years of age, one in which tenotomy of tendons and fasciæ and the continuous use of a properly-applied brace had failed to effect a cure, the following operation was done at the Episcopal Hospital: An incision two inches long was carried down upon the fibula to



Double talipes varus before operation (from a photograph).

within half an inch of the external malleolus. The fibula having been exposed, five-eighths of an inch of its shaft was resected, the sections being made with a fine saw. Forcible abduction of the foot almost corrected the deformity and closed the hiatus between the fragments to within perhaps one-sixteenth of an inch, and they were held in apposition by three or four turns of silk-worm gut carried through minute drill-holes in lower and upper fragments. The wound was dressed in the ordinary way, and the limb placed upon an internal metal splint. The wound gave no trouble, union being almost primary, and the child walked, four months after the operation, squarely upon the sole of his foot.

The other two operations were performed simultaneously upon a girl, twenty-three months old, at the Episcopal Hospital, November 17, 1894. The details of both operations were similar. After tenotomy of the tendo Achillis, though the equinus

element was almost absent, an incision two inches long was carried down to within half an inch of the external malleolus. The fibula, having been stripped of periosteum, was prepared out and three-eighths of an inch of its shaft excised with cutting forceps, the lower section being three-fourths of an inch above the lower end of the bone. Forcible abduction of the foot brought the sole beneath and a little beyond. A few strands of drainage were placed in the wound, and the limb dressed antiseptically upon an internal straight splint. A plaster-of-Paris dressing was applied fourteen days later, when a scanty serous oozing had ceased and the wounds were healed. The child showed no inflammatory reaction after the operation; indeed, none was to be expected, for the shaft of the fibula was not more than an eighth of an inch in diameter. As shown well in the photograph, the



The same case immediately after operation (also from a photograph).

deformity was somewhat over-corrected, and the deep folds of integument testify to the extent of shortening of the outer aspect of the limb.

The operation as compared with any of the tarsal resections or osteotomies which have been practised is very simple, free from risk, and involves no mutilation of the foot. Osteotomy of the lower end of the tibia is intended to correct the deformity upon principles which govern other osteotomies and operates in an entirely different manner from the procedure just described. While the simplicity of this operation may recommend it for many cases of talipes varus which cannot be corrected by tenotomy and force, its freedom from risk would seem to make it especially applicable to such cases, the subjects of which are in any way inclined towards or have tubercle or struma.

HERNIA IN THE LINEA ALBA.¹

By B. B. DAVIS, M.D.,

OF OMAHA, NEB.,

SURGEON TO IMMANUEL AND TO PRESBYTERIAN HOSPITALS.

G. W. K., male; white; married; aged forty-two years; book-keeper; good family history. Between the years 1887 and 1893, while located in McCook, Neb., I was several times called upon to treat this man for gastritis, which I then believed to be entirely due to alcoholism. He averred that the attacks sometimes occurred when he had drunk nothing for several months, but, for reasons at the time deemed sufficient, these statements were received with caution. The apparent certainty of the diagnosis led me to take measures for symptomatic relief without making that thorough methodical examination which ought always to be made in such cases.

His attacks were so nearly alike that a description of one may be considered typical of all. He would be taken to his home suffering with very intense gastric pain, vomiting, great nervousness, and cardiac depression, and usually with a temperature two to three degrees above normal. The ingestion of a teaspoonful of water would increase his suffering and provoke vomiting. I never succeeded in giving him the slightest relief except by the hypodermatic use of morphine.

These attacks, as a rule, lasted from three days to one week, when the symptoms disappeared as if by magic, and the attending physician was forced to the private opinion that the prompt convalescence was in spite of, rather than because of, his ministrations. These attacks usually, if not always, followed closely upon the heels of a debauch.

In the summer of 1893 I left for Europe, and all knowledge of his condition was lost sight of. He now informs me that he passed under the hands of several physicians, his attacks of pain growing more frequent, and his inebriations becoming more constant, until in May, 1894, he took the "Keeley cure." As is often the case, this

¹ Read before the Medical Society of the Missouri Valley at Sioux City, Iowa, March 21, 1895.

treatment neither cured his habit nor stopped his gastric pain, and his condition has been growing more and more pitiable.

In June, 1894, he removed to Omaha, and Dr. C. C. Allison, of this city, has had him in charge through two or three severe attacks. So many of the exacerbations of gastric pain were dissociated with alcoholism, and in view of the fact that the patient was having some joint rheumatism, one attendant was led to seriously consider the possibility of the existence of rheumatism of the muscular fibres of the stomach. When this idea was advanced, I confess to having to an extent shared the suspicion. With this exception, I think, all the physicians who had seen him considered the case to be a simple gastritis of alcoholic origin, occurring in a patient of exceptional nervousness and irritability.

January 2, 1895, the patient presented himself at my office, and stated that he had become convinced that he had cancer of the stomach, and wished me to examine him. He was directed to lie upon my office-chair, and my attention was at once attracted to a small, cyst-like body, not larger than a butter-bean, situated under the skin in the linea alba about one and a half inches below the xiphoid appendage. When I spoke of it he remarked that it did not amount to anything, that it had been there many years, and that doctors had told him that it was a small cyst. But I found, by careful examination, that pressure decreased its size, and that there was a distinct impulse and increase in size when he coughed. By careful manipulation it disappeared and a dimpling remained, suggesting that traction was being made from within the abdomen. The diagnosis was at once made of hernia in the linea alba with an adherent band of omentum within the sac, the other end of this band being attached to the greater curvature of the stomach. He was told that this was the probable cause of his severe and trying gastric symptoms.

Two days later Dr. Allison saw the case with me and concurred fully in the diagnosis, and united with me in advising an early operation. The patient gladly consented to the operation, saying that anything was preferable to his present condition. He had in the last few months been emaciating rapidly, having become only a shadow of his former self.

Accordingly, January 5, 1895, at Immanuel Hospital, he was subjected to an operation for the radical cure of the hernia. I was ably assisted by Dr. Allison. We felt much solicitude about his bearing the anæsthetic well, but were happily disappointed. An

incision about three inches long was made in the linea alba in such a manner that the hernial protrusion would be near the middle. The sac was separated from its surroundings and opened. It was found filled with adherent omentum. Tracing this inward, it was found to continue in the form of a band to the greater curvature of the stomach not far from the pylorus. This band was pulled forward, tied with catgut, and cut off. But the ligature had not been tied securely and slipped. There being no hæmorrhage, no effort was made to reapply the ligature.

Next the sac, with adherent omentum, was drawn as far out as possible and transfixed with a double silk thread, which was tied each way. The sac was then cut off near the ligature. The deep fascia was then united by means of a few interrupted catgut sutures. The sheaths of the recti muscles were now opened to insure firm union, and closely placed silkworm-gut sutures introduced through skin, superficial fascia, and recti muscles to the deep fascia.

The patient's temperature before the operation was 99.6° F., and rose once afterwards to 100° F. The convalescence was a normal one, and from the time of the operation there was complete absence of the old pain. He complained a few times of pain in the region of the wound, but this complaint was evidently due to a desire for morphine, for which he had acquired a habit.

The first change of dressings was made on the tenth day, and the wound found perfectly healed and the stitches removed. The gastric pain is apparently completely cured, and at the time of writing this report the patient is at work in a more comfortable condition than he has been for many years.

The dearth of literature upon the foregoing subject is deemed sufficient reason for relating this case at length. The leading American text-books upon surgery either do not mention it at all or dismiss it with a line. Careful search through a large number of American surgical works has failed to discover a word to indicate the severe gastric symptoms which a slight hernia in the linea alba may cause. This lack of literature upon the subject seems to me a sufficient apology for those of us who attended this case without making a correct diagnosis. Several careful men had had the case in charge.

Bergmann, of Berlin, stated in a clinical lecture last winter

that he has found more than a dozen cases in which the best specialists of Berlin and Paris had diagnosticated gastritis, ulcer, or cancer of the stomach, and had persistently employed lavage, rigid diet, and the other most approved modes of treatment without relief. Hernia in the linea alba had then been discovered, an operation done, and relief followed in every case. Koenig, in the last edition of his text-book of surgery, draws a vivid picture of the symptoms produced by the trouble which simply accentuates the experience of Bergmann and the present case. He says, "The characteristic ruptures which evoke suffering in the stomach regularly have—we speak at least from our own experiences—either a small mass of omentum in the sac, so that it cannot slip back on account of the narrow neck, or a strip of omentum has become adherent in the sac and, perhaps, also to the border of the neck. In the cases in which we could follow it, this band passed to the greater curvature of the stomach, so that when the stomach was moved the band of omentum was dragged upon, and only by the complete severing of this band could the symptoms be relieved."

The picture is very distinct. The hernial sac is almost invariably small, so small that it is not likely to be noticed unless search is made for it. The strand of adherent omentum is an almost constant accompaniment. The traction upon the greater curvature of the stomach produces most distress immediately after the ingestion of a meal, or when the stomach is filled with gas. This fact gives additional evidence of gastritis, ulcer, or cancer. As any one will agree, after a perusal of this case, the complexus of symptoms produced by this little trouble is entirely out of proportion to the anatomical changes. That severe, often repeated, or constant epigastric pain does not necessarily indicate a pathological condition within the stomach, but may be entirely extrinsic, a study of the case just reported will prove. If this contribution is so fortunate as to impress upon the profession the need for greater care in the examination of patients suffering from pain in the gastric region, its object will have been accomplished.

A NEW METHOD OF EXAMINATION AND TREAT-
MENT OF DISEASES OF THE RECTUM
AND SIGMOID FLEXURE.

By HOWARD A. KELLY, M.D.,

OF BALTIMORE,

PROFESSOR OF GYNÆCOLOGY AND OBSTETRICS IN THE JOHNS HOPKINS
UNIVERSITY.

FOR the past eleven years I have been in the habit of examining the rectum by means of a speculum and reflected light with the patient in the knee-breast posture. I found, however, the various specula at my disposal so unsatisfactory that I have not published my method at an earlier date, preferring to wait until I might be able to devise better instruments.

I have now accomplished this, and for two years past in my clinic at the Johns Hopkins Hospital I have been demonstrating the superiority of this means of investigating the condition of the lower intestinal tract to hundreds of visitors from all parts of the United States, and from abroad.

A preliminary notice has already appeared in the *Johns Hopkins Hospital Bulletin*, for December, 1894.

I shall now describe my procedure in detail, which has the following advantages: (1) An ocular examination of the ampulla, the upper rectum, and the sigmoid flexure; (2) the bowel is distended to such a degree that its walls appear smooth, and there are absolutely no concealed areas; (3) a large area is visible at one time, so that a complete investigation may be made in a few seconds; (4) local treatment is as easy as inspection, even in areas so remote as the sigmoid flexure.

The steps are briefly these,—

(1) Through evacuation of the lower bowel.



FIG. 1.—Posture of patient for proctoscopy and sigmoidoscopy. Under anæsthesia the pelvis is suspended and the knees held up as shown. The proctoscope and sigmoidoscope are shown above, reduced in the cut on exactly the same scale as the patient's body. The sigmoidoscope is therefore about as long as the thigh. The rectal dilator and applicator are shown to the left, reduced in the same way.

(2) Knee-breast posture.

(3) Introduction of a cylindrical speculum provided with an obturator.

(4) Withdrawal of the obturator, followed by distention of the bowel with air.

(5) Inspection of the dilated bowel by light reflected from a head-mirror, through specula of various lengths and diameters.

The lower bowel is usually empty soon after an evacuation; it may also be cleansed by a purgative given the night before, or an enema a half hour before the examination.

Anæsthesia is unnecessary in using most of the specula which are of small calibre, and none of the various manipulations are painful.

The patient kneels on an ordinary table, a common kitchen table is quite convenient, with the elbows spread out at the sides so as to bring the chest as close to the table as possible, while the thighs are perpendicular to it, supporting the pelvis as high as possible. (Fig. 1.)

I use a large number of specula of different diameters and lengths, but the following constitute a practical set sufficient for all ordinary purposes: A short proctoscope, 14 centimetres ($5\frac{1}{2}$ inches) long and 22 millimetres ($\frac{1}{2}$ inch) in diameter; a long proctoscope, 20 centimetres (8 inches) long and 22 millimetres ($\frac{1}{2}$ inch) in diameter; and a sigmoidoscope, 35 centimetres (14 inches) long and 22 millimetres ($\frac{1}{2}$ inch) in diameter.

Every speculum is provided with a blunt obturator with a stout handle.

The short proctoscope (Fig. 3.) is first taken up and well coated with vaseline, and grasped in the full fist, pushing the obturator in with the palm of the hand during its introduction.

The buttocks are drawn apart and the blunt end of the obturator is laid on the anus, which is also coated with vaseline. The direction of introduction should be at first downward and forward, and when the sphincter is well passed up under the sacral promontory. The moment the speculum clears the sphincter area and the obturator is withdrawn, air rushes in audibly, and distends the bowel.

The bowel is illuminated in the following manner: A strong light—daylight will answer, but an electric light is most convenient—is held close to the sacrum, and the examiner, wearing a head-mirror, directs the rays through the tube into the bowel.

By turning the tube a little in various directions the whole of the ampulla appears in sight as a large pouch with smooth



FIG. 2.—Sigmoidoscopy. The instrument seen above to the right is introduced down to the very end, as seen in the cut, which is taken from a photograph. The electric light held over the sacrum is reflected by the head-mirror to the bottom of the tube, giving a perfect picture of the bowel at the other end.

walls, hugging the pelvic floor and sacral hollow above, and below in apposition with the vagina. The slightest peculiarities in shape or color of its mucosa, or the slightest elevation of surface, or a secretion sticking to it, is at once visible.

Above the ampulla there is a vista between two or three pro-

jecting valves on both sides leading through the upper portions of the distended bowel.

By introducing the long proctoscope (Fig. 4) carefully these



FIG. 3.—Short proctoscope (cylinder, 14 cm. x 22 mm.) for examining the ampulla and lower rectum. Blunt obturator is seen at the side. Four-sevenths actual size.

folds are pushed aside without resistance, and the bowel above comes into full view. There is considerable variation in the direc-

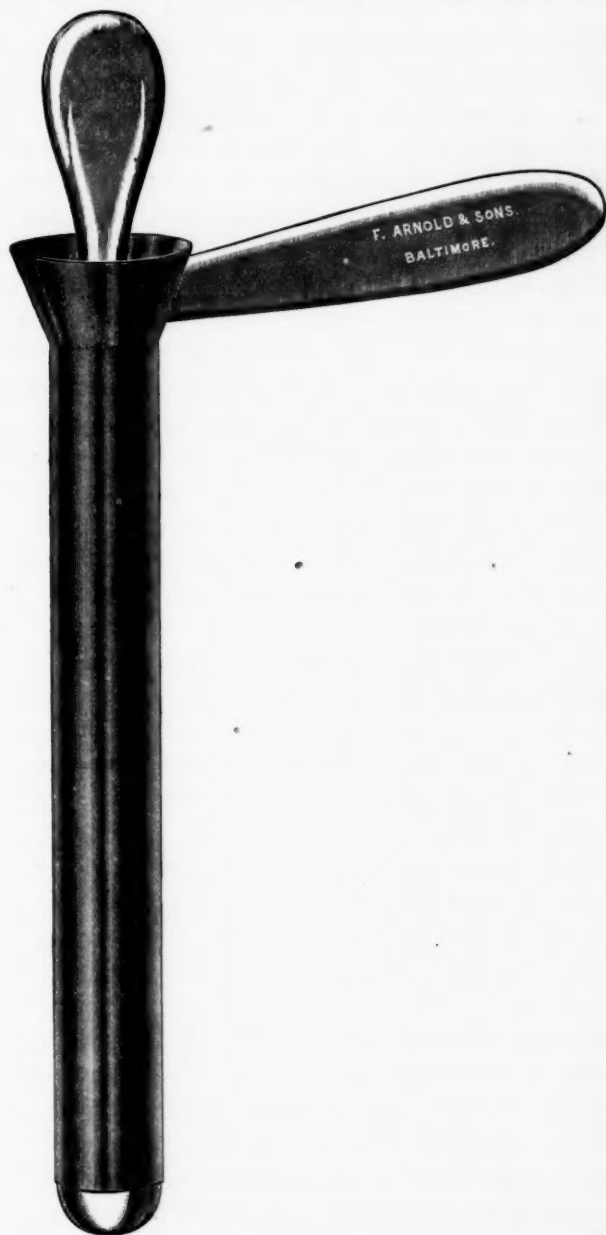


FIG. 4.—Long proctoscope (cylinder, 20 cm. x 22 mm.) for examining the upper rectum. Obturator is in place in the speculum. One-half actual size.

tion of the axis of the distended rectum; sometimes the view from the ampulla between the valves extends as far as the sacral promontory. The promontory is easily recognized as a smooth, rounded eminence on the dorsal surface of the bowel, feeling like bone when touched with the end of the speculum.

Upon introducing the sigmoidoscope (Fig. 5), the longest speculum, the investigation is continued up into the dilated sigmoid flexure in the false pelvis by turning the handle to the right. At some point in the flexure the atmospheric distention ceases, and the lumen of the bowel can then only be followed farther by cautiously pushing the end of the instrument on through the lax collapsed folds. I have been able to carry my sigmoidoscope in over thirty centimetres (twelve inches) in this way. (Fig. 2.)

Sometimes the view is not satisfactory, owing to little obstructing masses of fæces; these may be readily removed with the scoop. (Fig. 6.) A little mucus on the surface of the bowel may be cleared away by using a long applicator, devised by Dr. Otto Ramsay, my associate.

Other causes interfering with a satisfactory view, are these: the patient may not let the chest down close enough to the table; or, if a woman, a corset may keep the bowels from gravitating towards the diaphragm; or, gravitation may take place slowly and the bowel open up slowly, the speculum following it centimetre by centimetre.

I have plainly seen and sounded a stricture of the bowel fourteen centimetres (five and a half inches) above the anus, in a case in which I had previously handled it through an abdominal incision, when removing uterus, ovaries, and tubes for pelvic abscess.

I have recently seen a polypus not more than five millimetres in diameter, ten centimetres (four inches) above the anus.

I have also repeatedly had occasion to examine cases diagnosed and treated for years as colitis, when I found the rectum the seat of a chronic inflammatory trouble, limited either above or below the promontory by a perfectly sound mucosa.

I use three other rectal instruments which I desire to describe: a conical sphincter dilator, shown in the text three-fourths



FIG. 5.—Sigmoidoscope (cylinder, 35 cm. x 22 mm.) for examining the sigmoid flexure. The detachable handle is seen above to the right. The obturator is in place in the speculum. Two-fifths actual size.



FIG. 6.—Scoop for removing small faecal obstructions forty-two centimetres long. One-third actual size.

actual size. (Fig. 7.) This is better than the series of dilators generally used, possessing in its conical sides an infinite series in one, and so avoiding the repeated removal and introduction of different numbers. The numbers seen on the scale are the diameters in millimetres. An applicator (Fig. 8), made of a piece of stout copper

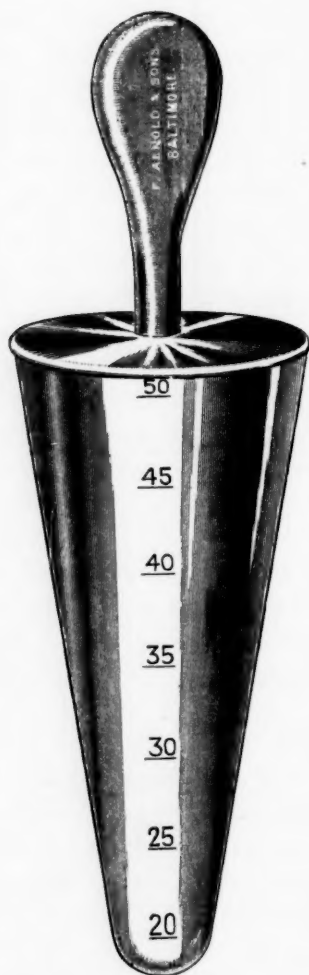


FIG. 7.—Conical sphincter dilator. The diameters of the various parts are indicated in millimetres. The figure is three-quarters actual size.



FIG. 8.—Copper-wire cotton applicator, forty-two centimetres long. One-third actual length.

wire, about forty-two centimetres long, is useful in topical treatments.

The sphincteroscope (Fig. 9), shown three-fourths actual size in the text, is short and conical. It is used by pushing it into the ampulla, and then withdrawing it until the sphincter circle closes well over it; by withdrawing it slowly by steps, each time



FIG. 9.—Sphincteroscope. The cylinder is four centimetres long, and its diameter at the upper part is three centimetres; at the lower end 2.5 centimetres. The flange is five centimetres in its greatest diameter. The obturator is in place. Three-quarters actual size.

pushing it back a little, the whole sphincter area is brought beautifully into view. Each time it is pushed back during the withdrawal it does not re-enter the portion of the bowel just left, but simply flattens out the area within view for a more perfect inspection.

I have had a variety of larger instruments made for examination and treatment of the bowel, but offer these sizes as a practical set.¹

I also frequently use one of my bladder specula, nineteen to twenty millimetres in diameter, and secured by it a perfectly satisfactory inspection of the lower bowel.

¹ My instruments were manufactured by Arnold & Sons, Baltimore, Md.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, January 9, 1895.

The President, ROBERT ABBE, M.D., in the Chair.

SURGICAL RELATIONS OF THE NEW, SMALL-CALIBRE RIFLES (MANNLICHER SYSTEM).

DR. A. G. GERSTER exhibited to the society a new, small-calibre rifle, which he had recently imported, saying that it was of importance on account of the very important part which such weapons were likely to play in the next war. All the large European armies have been provided with such rifles, and the United States army and navy also are being furnished with them. When this weapon was used for the first time in the field, which was during the Revolutionary war in Peru, a number of reports were made, according to which it was to be presumed that the effects upon the human frame were not as destructive as those of the older rifle, although it was stated that the projectile shot from this rifle would put out of service a larger number of men, because the magazine could be fired very rapidly, and it carried much farther than the old-fashioned rifles. It has since been shown, however, that this weapon is infinitely more destructive in all regards than the older one.

To make one comparison between the two, it has been observed by war surgeons as not at all a rare occurrence for the bullet, fired from the ordinary gun, to glance off of a large vessel, or push it to one side, without injuring it or destroying its utility; with this new weapon such a thing is utterly impossible. If the projectile from it comes in the slightest contact with a vessel, the utility of that vessel is absolutely destroyed. The consequence of this will be that a great many more soldiers will die on the battle-field from hæmorrhage due to injuries inflicted upon the large vessels.

As regards the effect upon bone, it has also been found that the

destructive effect of this weapon is infinitely greater. This fact is explained by the structure of the weapon itself and by the ammunition used.

Of late years there has been observable a tendency towards the reduction of the calibre of rifles. The reason for this is the fact that, given the same amount of driving power in the explosive, while at the same time reducing the transverse section of the projectile without diminishing its weight, the velocity is very much increased, —that is, the smaller the transverse diameter of the bullet with the same weight and the same amount of powder, the more rapidly is the projectile driven. But this fact was not of much practical effect until a new powder was discovered, a powder made principally of cellulose. Among the first attempts to manufacture this wood-powder for sporting purposes some were made in this country also, but it was so imperfect as to act as a detonator, with the consequence that the weapon was frequently shattered.

The Belgian, Wetteren, finally produced a powder which had all the advantages of a very rapidly-exploding powder, without being detonating, a so-called smokeless powder, which will produce twice as great an effect, weight for weight, as the old powder. In order to get the full benefit of this, it was necessary to increase the resistance of the projectile to being driven out of the barrel by the explosion of the powder, and that was accomplished by making the projectile somewhat larger than the calibre of the barrel whereby it was driven with great force into the riflings, and the full explosive effect of the powder was gotten out of the weapon. But it was noticed that lead bullets either did not take to the riflings at all, or if they did they so clogged these as to interfere very much with the usefulness of the weapon. Therefore experiments were made with projectiles of a different material, notably steel. This was found to take the riflings, being less easily shaped than lead, its power of penetration was very much greater, but it had the great drawback of being lighter than lead, which caused it to lose its velocity sooner. Finally, a shell was used, composed of an alloy of nickel and steel, which took readily to the riflings, was hard enough to prevent stripping, and which could be filled with chilled lead in order to give it the necessary weight. The projectile used in the Austrian army has a calibre of eight millimetres. Prussia has one of seven millimetres and a fraction, while Roumania is going to use a projectile of 6.5 millimetres in diameter. While the old weapon had a twist in the rifling of three-quarters of

one complete turn, this new rifle has three complete turns in a shorter barrel, one twenty-eight to thirty inches in length. If, then, one takes into consideration the fact that the projectile is one-tenth of a millimetre greater in diameter than the calibre of the rifle, he will understand what a great amount of resistance is offered the highly-explosive powder, and will recognize the fact that the projectile must leave the rifled barrel with tremendous force and speed. This will be best appreciated when it is stated that, whereas formerly the greatest initial velocity of the bullet shot off with black powder was 800 feet, sometimes, possibly, 1000 feet, per second, this new bullet travels about 2000 feet during the same period, and makes 2660 revolutions around its own longitudinal axis during the first second.

DR. GERSTER presented some plates showing the results of a large number of experiments with the gun, made by a commission appointed by the German government. The experiments were made upon fresh cadavers, upon dry bones, upon living animals, etc. Although the bullet is a very hard one, yet when it comes in contact with a hard body at its higher rates of speed, it is completely shattered or more or less deformed, which, of course, adds greatly to its destructive effect. When it strikes a receptacle containing a fluid, or the skull containing the brain, which is a semifluid substance as it were, that receptacle is completely shattered. This remark applies to the liver, the spleen, the heart in diastole, but not in systole. But when it strikes an empty receptacle, as the skull from which the brain has been removed, it makes simply a clean entrance and exit, and does not shatter the body. The exit aperture is somewhat larger than the entrance. If the gut is hit by the bullet it is always torn. The lung is the only organ which shows a greater proportion of cures after injury with this new projectile than after the old. The illustrations show that where bone is struck it is shattered, the fragments being carried out of the body along with all tissues which stand in their way. The fragments spread out in the shape of a cone, thus making the aperture through which the bullet leaves the body much larger than when the old weapon was used.

The weapon is much lighter than the old-fashioned ones. The cartridges are furnished in packages of five, and, being lighter in weight, each soldier can carry twice as many of them as of the old form. The package is pressed into the magazine in the stock of the gun, each cartridge as it is fired has the waste shell thrown out by the same quick movement which brings the next cartridge into place.

When the five have been fired, another package is inserted. In a riot in Austria ten soldiers were commanded to fire into the mob, which refused to disperse; the ten bullets wounded thirty-four men, six of whom died on the spot, seven died within a week, the rest recovered. One bullet penetrated on an average four men. Habart, an Austrian military surgeon, has tested the ballistic and other qualities of the projectile, and has found that at a distance of 5600 metres, or more than 5600 yards, the velocity is still seventy-five yards a second, which is just sufficient to kill a man.

TREATMENT OF INJURIES OF THE SPINE AND CORD BY SAYRE'S PLASTER-OF-PARIS JACKET.

DR. F. S. DENNIS read a paper on this subject (see p. 268).

DR. L. S. PILCHER thought one feature connected with treatment of injuries of the spine and cord by laminectomy had not been sufficiently dwelt upon in the discussions which had taken place upon this subject at several meetings of the society during the past year. He referred to the greater mobility of the spine fragments following such operations. In a number of cases of this kind, which had come under his own observation in past years, there had been evidently much greater mobility after the laminectomy than before, the cord being thus constantly exposed to injury. This fact had been so strongly impressed upon his mind as to constitute a controlling reason for desisting from such operative procedure, except in the presence of well-defined indications.

As illustrating the possibility of such damage from laminectomy performed soon after injury, he mentioned a case in which the symptoms were such as to enable him to predict that the bullet must have lodged at a certain point within the spinal canal. He accordingly cut down, exposed the cord, found and removed the bullet, which had entered from in front and to one side, and was embedded in the substance of the cord at the level of the first dorsal vertebra. The injury had been sustained only a few hours before. The patient died within twenty-four or forty-eight hours after the operation. He believed the rapid death to have been due in part, perhaps in large measure, to the additional traumatism of the operation. A similar injury was shown in one of the specimens of Dr. Dennis, where the patient lived seven months, no operation having been performed. It

might be of great importance to some people to live this additional seven months.

Experience, then, had led him to the conclusion that the indications for operative interference should be very well marked and of a positive nature before one should undertake it.

DR. CHARLES K. BRIDDON said he had recently read an article bearing on the question raised by Dr. Pilcher as to liability of undue mobility of the spine following laminectomy. The author, whose name he could not recall, took the ground that such danger need not be apprehended. Dr. Briddon thought it was probably the extravagant opinion of one of the advocates of the bloody method of treating these cases. For his own part he could hardly conceive how the removal of from four to six or more spinous processes of the vertebræ could do otherwise than render the spine unnaturally mobile. He had seen quite a number of such cases in his own hands or in that of others, and he could not recall one recovery. He would refer to a case of gunshot wound of an upper cervical vertebra in a young woman who was brought to the hospital completely paralyzed in both upper and lower extremities. He operated immediately, removing spiculæ of bone, etc., but the bullet was not found. Not a great deal of damage had been done the cord, although the canal had been opened by the bullet. The patient lay in the hospital about a year and then was taken out by friends to die. It was only by extreme care that, up to the time she left the hospital, she had escaped cystitis, pyelitis, etc. One group of muscles of the forearm acquired ability to respond to pricking, but there was practically no restoration of motor function.

Dr. Briddon thought that in the future he would become an ardent advocate of the treatment recommended by Dr. Dennis, immobilization of the spine by plaster of Paris. If there were only fracture of the spinous processes, it was plain that an operation should be resorted to, but in a large proportion of the cases there was also injury of the body of the vertebræ, and while at least one surgeon had been bold enough to advocate resection of these, he did not know whether it had yet been done. Again, he had seen learned neurologists locate the lesion at some spot in the cord, and operation fail to confirm the opinion. He would not feel certain unless a neuropathologist should tell him where the lesion was, and then he should not place a great deal of reliance upon it.

While applying the plaster jacket, reliance should not be placed alone upon the assistants to support the point of injury by making

traction upon the extremities, as these rested upon supports. There should also, he thought, be a tripod or support of some kind to prevent accidental sagging at the point of fracture.

DR. GEORGE WOOLSEY recalled two cases of spinal hæmorrhage, one with, the other without apparent fracture-dislocation. These cases were treated on the expectant plan with all possible care, but the unsatisfactory results obtained had almost converted him to the employment of operative treatment in the future in such cases, although he was opposed to it in the majority of cases of fracture. The spontaneous improvement, which set in after a limited period during which the symptoms increased, soon ceased and left the patients permanent cripples. He could not say what would have been the result of treatment by the plaster-of-Paris jacket and stretching, yet in the future he should be inclined to try it in cases where hæmorrhage was a marked feature and which were not subjected to operation.

In a third case of simple fracture of the spine treated by the application of a plaster jacket without stretching, marked improvement, though not an absolute cure, had resulted, so that the patient could go about with support.

DR. ROBERT ABBE said he had at former meetings expressed himself in opposition to operative interference in fracture of the spine except in rare cases, such as where the lesion could be clearly located and it seemed probable an operation would be successful in relieving pressure. The paper read by Dr. Dennis had convinced him further of the limitations of operative interference. He believed we should try pretty universally treatment by the plaster-of-Paris jacket and extension. He regarded extension as an important part of the procedure, since it in all probability acted in some degree towards reducing the deformity, relieving pressure, and restoring the spine to its normal curve.

It was his opinion that, ordinarily, when the bodies of the vertebræ were intact, laminectomy would not impair the strength of the spine. He had performed the operation a number of times, and had never been able to recognize the slightest difference in the suppleness of the spine.

DR. DENNIS said he had purposely avoided the subject of laminectomy on this occasion. It was for the benefit of that class of cases in which no operation was justifiable, and which were usually left to die, that he had advocated the use of plaster of Paris. The method

of applying the jacket in order to avoid risk of sagging at the point of injury during the procedure was described. He had been much surprised to learn what proportion of cases treated by this method had recovered, although they had before suffered loss of both motion and sensation. The man whom he had presented at the last meeting had been completely paralyzed for seven months, and when he applied the jacket he had no idea that the patient would ever walk again, yet within three months he was able to move about on crutches, and had since returned to business.

STENOSIS OF APERTURE OF CHOLECYSTENTEROSTOMY TEN MONTHS AFTER OPERATION BY MURPHY'S BUTTON.

DR. ROBERT ABBE presented a specimen consisting of a part of the intestine, gall-duct, and neighboring tissues, which he had been able to secure in the case reported a few weeks ago of cholecystenterostomy on a woman who had cancer involving the head of the pancreas and first part of the gall-duct, causing obstruction and distention of the gall-bladder. About a year ago he had opened the gall-bladder when she was almost moribund, and established a bile fistula through which there escaped about a pint of bile a day for six weeks. At the end of this time the patient's condition had greatly improved. He then established anastomosis by Murphy's button between the gall-bladder and duodenum, the button passing on the twelfth day. The patient remained in perfect health until eight weeks ago. She then had an attack with symptoms of gall-stone colic. He had mentioned the fact to the society a few weeks ago, and had expressed the opinion that it was likely stenosis was taking place. She had a third attack, went into profound cholæmia, and died in convulsions after two days. The specimen sent him by the physician who made the autopsy showed cancer of the head of the pancreas, with obstruction thereby of the common duct. The disease had crept up a little and obstructed the cystic duct. The opening created between the gall-bladder and duodenum had become absolutely stenosed by cicatricial contraction, ten months after its establishment by a half-inch Murphy button. The stenosed part was tested by distention with fluids and was found to be quite tight, permitting none of the fluid to pass. Replying to interrogatories, Dr. Abbe said the malignant disease had not invaded the anastomosed parts, but was located an inch and a half to two inches distant.

DR. A. G. GERSTER remarked that he did not think it was necessary to assume that there was malignant infiltration to account for the stenosis. It had been stated that there was also stenosis of the cystic duct. Before this occurred the flow of bile would tend to prevent contraction at the point of anastomosis, but afterwards the natural tendency would be to occlusion, as was the rule with tracts thrown out of physiological use, especially if embarrassed by circular cicatricial deposit.

DR. ABBE said he had had this point in mind, but it was found that while the bile was not passing into the gall-bladder, still, this organ was distended by its own secretions.

DR. WILLY MEYER suggested that the secretion and distention in the gall-bladder were consecutive to the shrinking of the artificial channel of communication between the gall-bladder and duodenum, the constriction having resulted from cessation of bile-flow, and this again from occlusion of the cystic duct by the cancer. The mucous secretion afterwards distended the bladder. The *vis a tergo* from the side of an accumulation of mucus distending the gall-bladder cannot be equal to that of the continuously running bile. He thought the point raised by Dr. Gerster was an important one, that the shrinkage at the site of anastomosis was due to want of physiological use, the passage of bile to this point having been prevented in the cystic duct. This accident had not occurred in any of the numerous cases before reported, and the explanation mentioned seemed to him the probable one. He would add that his first patient operated upon with the help of Murphy's button, a case of resection of the pylorus for benignant stricture and insertion of the cut end of the duodenum into the posterior wall of the stomach, was perfectly well to-day, ten months after the operation. She had gained forty pounds and could partake of all kinds of food without the slightest annoyance.

DR. GERSTER called attention to the analogy between the cicatricial process and constriction, which takes place in cases like that under discussion, and in the diseased or injured urethra when for any reason the urine is diverted entirely from this channel. He had at present under his care a boy who was run over by a street-car, and whose urethra was bruised excessively. A perineal fistula was also caused by the injury, and gave vent to all the urine from the bladder. The result of this had been that the boy's urethra has become absolutely closed by cicatricial tissue. It is known that even very tight urethral strictures do not close readily as long as they are frequently called

upon to permit urine to pass through them. They may become impermeable to instruments, but urine in sufficient quantity to relieve the patient will continue to pass. But divert the urine from such a cicatricial ring, it makes no difference to what other course, and the ring will close entirely. It is the same with the anastomotic ring from Murphy's button. The tendency to closure must be there, and occlusion will become absolute unless the secretions continue to pass and keep it open.

REVIEWS OF BOOKS.

SURGICAL PATHOLOGY AND THERAPEUTICS. By JOHN COLLINS WARREN, M.D., Professor of Surgery in Harvard University; Surgeon to the Massachusetts General Hospital. Illustrated. Philadelphia: W. B. Saunders, 1895.

The surgery of the present day is distinguishing itself from the surgery of the past few decades, not so much in the perfecting of the mechanical art as in the development of surgical pathology; and the surgeon of the future, if he would embellish himself with something extrinsic to his art, will choose to study the histogenesis of sarcoma in preference to the branches of the external circumflex division of the profunda femoris artery. Surgical pathology is teaching the surgeon that carcinoma is not a lump to cut off, but that it is an insidious, spreading disease, and that it more closely resembles erysipelas than it resembles a wart. With the growth of surgical pathology in this country, American surgery is in less danger of sustaining the setback which it received at Washington a few years ago, when one of its champions announced before a great meeting of surgeons that he opened the axilla in breast cases only when he could feel through the skin that the glands were enlarged. It is one of the functions of such works as that which lies before us to encourage in the surgeon the use of the "microscopic eye" as an aid to the finger.

The book opens with two chapters on the general principles of bacteriology and surgical bacteria. The following six chapters are given to the subjects of hyperæmia and inflammations. These latter are divided into simple and infective, and are discussed from the standpoint of modern pathology. The chapter on the process of repair is excellent. The same may be said of the two following on gangrene and shock. The general subject of fever is treated very elaborately;

and the thirteen succeeding chapters are devoted to the special surgical infections. Three chapters are given to tuberculosis, the first of which deals with the subject in a general way, and the other two with tuberculosis of the joints and soft parts. Non-tuberculous bone diseases are given a special section. Lastly is treated the important subject of tumors. The work closes with a chapter on aseptic and antiseptic surgery, and an appendix.

The author, in addition to producing a scientific work, has added many observations of a general character pertaining to the domain of physiology, history, and poetry. The chapter, for example, on hospital gangrene reads much like a war article in the *Century Magazine*. The horrors of Andersonville are graphically described; and the pathetic appeal made to the Richmond government by Lieutenant-Colonel D. T. Chandler, of the Confederate service, begging that no more prisoners be sent to Andersonville, would certainly touch the coldest heart.

The chapter on snake-bite is rich in snake-lore. We are informed that "in 1881 the number of snakes killed for the bounty offered by the British government amounted to 254,968." Of the thrilling snake-story in which is related how the

"Wretched Sabellus by a seps was stung;
Fixed to his leg with deadly death it hung:"

the author remarks, "The direful effect of serpent-poisoning upon the tissues is graphically described by Lucan ("Pharsalia," book ix), who records the somewhat exaggerated stories of Cato's soldiers in their march through the Libyan desert. (This passage is also interesting as being probably the first occasion in which the peritoneum is mentioned in poetry.)" Then follows Rowe's translation of the verses. All of this is, of course, very interesting, but when the student or the physician takes down a volume to seek for knowledge on the subject of snake-bite, he is not concerned for the "wretched Sabellus," nor the "exaggerated stories" of Cato's soldiers, nor does he think that the first appearance of the peritoneum in poetry has anything to do with the case.

In the chapter on phosphorus-necrosis, the following sentence serves to illustrate the broadness of the author's technical learning: "The chemical composition employed consists of phosphorus and chlorate of potassium with particles of ground flint to assist friction, a coloring agent, and the best quality of Irish glue."

It is to be regretted that a place is given in this work on surgical pathology to endorse the nitric acid method of Chiene for detecting "the presence of cancer in an amputated breast."

We can hardly agree with the author that "an ulcer is a solution in continuity of the skin or the mucous membrane which shows no tendency to heal," for is it not so that an ulcer does show a natural tendency to heal?

The work is systematically arranged, and, compared with most works in the English language on the same subject, it contains a large amount of information. Comparatively little space is given to therapeutics, and it is interesting to learn that at last a book has been written in which the author states that, though the sulphide of calcium is supposed to possess unusual virtues in the checking of circumscribed suppurations, he has never seen any satisfactory results from its use.

Space is not encumbered with the omnipresent illustration of the act of transfusion, with its two strong arms and rubber connections. Even when this old method had become obsolete, surgical authors continued to give it space in their books, as, for example, the "Modern Surgery" of Roberts fully describes the method which even at the time of its publication was practically antiquated, and scarcely mentions the method of saline infusion, which was then fully in vogue. So it is with satisfaction that we read in Warren's work that "transfusion is now abandoned, but there may be resorted to, in cases of shock attended with great loss of blood, infusion of warm salt solution, etc."

The patriotic student will find on page 386 a reference to the scientific work of Dr. O. W. Holmes, who has never received from the medical profession the honors to which he is entitled, as he has

from his literary *confrères*; and with very natural Bostonese pride the author pays the memory of the worthy doctor a just compliment in referring to his work on puerperal fever and erysipelas.

A most striking and very excellent feature of this book is its illustrations. Without exception, from the point of accuracy and artistic merit, they are the best that we have ever seen in a work of the kind. A large number are colored. Many of those representing microscopic pictures are so perfect in their coloring and detail as almost to give the beholder the impression that he is looking down the barrel of a microscope at a well-mounted section. Plate IV, illustrating gangrene of the leg following ligature of the femoral artery for popliteal aneurism, must be designated as simply beautiful. If the femoral was not tied by an artist, at least the picture was made by one.

The value of the text is enhanced by being interspersed with brief reports of illustrative clinical cases printed in smaller type.

The publishers have done their work well. The type is large and clear, and the paper is smooth and strong. The book is a beautiful example of the *fin de siècle* printer's art.

JAMES P. WARBASSE.

CORRESPONDENCE.

EFFECTS OF UNILATERAL CASTRATION ON THE PROSTATE.

I DESIRE information from surgeons in this country as to the effect of unilateral castration upon the total bulk of the prostate.

The existing evidence is scanty, but seems to point clearly to one-sided atrophy of the prostate as a common result of the removal of one testicle. Some experiments which I am now making on dogs corroborate this view, as does the observed condition of the prostate in monorchids. If it is found that the diminution in size extends to the other lobe, or if the shrinking of one lobe will in any large proportion of cases remove or lessen the mechanical obstruction to urination, it is obvious that the good effects of a simple and safe operation might at once be extended to a much larger number of patients and at an earlier and more favorable stage of the disease.

I now have several cases under observation, and hope by further experiment to throw more light on the subject, but conclusive clinical evidence must already be in existence, and I write in the hope that it will be sought for by those surgeons who have removed one testicle for disease or injury, and whose patients are accessible for examination.

J. WILLIAM WHITE.

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THE SURGICAL TREATMENT OF TORTICOLLIS,
WITH ESPECIAL REFERENCE TO THE SPINAL
ACCESSORY NERVE.

By ELLSWORTH ELIOT, JR., M.D.,

OF NEW YORK,

ASSISTANT ATTENDING SURGEON TO THE PRESBYTERIAN HOSPITAL; CHIEF
IN SURGERY AT THE VANDERBILT CLINIC; ASSISTANT DEMON-
STRATOR OF ANATOMY IN THE COLLEGE OF
PHYSICIANS AND SURGEONS.

IT is not intended by the writer to epitomize and present the history of the operative procedures in the treatment of torticollis. In this particular branch of surgery the introduction of antiseptics, if it did not actually revolutionize the methods of treatment, did much to establish a feeling of confidence on the part of the surgeon that enabled him to revive older measures, as, for example, the division of the spinal accessory nerve, with the firm conviction that such an operation, involving, as it does, penetration beyond the plane of the deep cervical fascia, would not be followed by the development of blood-poisoning.

Not only, however, was, by the introduction of antiseptics, the great danger of wound infection very largely eliminated, but also, by obtaining primary union, disagreeable and frequently unsightly scarring was avoided. In such a conspicuous part of the body as the face and neck the probability of such unfortunate scarring (provided that the patient escaped the primary danger of infection) led the "pre-antiseptic" surgeon to perform the operation of division of the tendon of the sterno-mastoid through a very small incision, constituting, in fact, a punctured wound, through which, in the first place, it is difficult as well as uncertain to operate satisfactorily; and, in the second place, such a wound as this, as is well known, is more apt to be followed by infec-

tion, provided that the agents of infection exist, than is the case with a wound in which the division of the skin and subcutaneous tissue is more extensive, and more in suitable proportion to the exposure of the underlying tissues.

Therefore we shall treat of the different operative procedures which the surgeon can satisfactorily perform, with the knowledge and co-operation of antiseptic principles.

Before we do this, however, a comprehensive description of the anatomical features of torticollis, and, secondly, of the different varieties of this trouble, will facilitate the selection of any special therapeutical measure for any individual case.

By torticollis is usually meant the position of the head that results from an abnormal shortening of the sterno-mastoid muscle. The head enjoys great freedom of movement in virtue of several joints. Of these, the atlo-occipital articulation is admirably adapted to the so-called nodding movements,—namely, flexion and extension, the atlo-axoid to very extensive rotation, while lateral motion (abduction) is accomplished by the movement of the cervical vertebræ on each other. If the right sterno-mastoid contracts, moderate extension, a sweeping of the chin towards the opposite (left) side, and an approximation of the right side of the head to the right shoulder occur, as a result respectively of movement in the joints just mentioned.

But, although the study of the contraction of a sterno-mastoid enables us to appreciate the position of the head in torticollis, yet, on the other hand, it must be remembered that other muscles passing over these joints necessarily contribute, if in a condition of contraction, to the false position of the head. Posteriorly, the muscles of the neck, taking their point of action from their origin at the bony process of the upper dorsal and lower cervical vertebræ, extend the head, if they pass over the atlo-occipital joint to the occiput, in virtue of their vertical fibres, whereas, in addition, those muscles which move obliquely upward and outward to the lateral portion of the occiput approximate the head to the shoulder on the same side, as does the corresponding sterno-mastoid. The deeper muscles, attached to the transverse process of the axis and passing over the atlo-axoid joint, rotate

the head upon a vertical axis to a lesser or greater degree, according to the obliquity and number of their component fibres. Then, again, the result of this action resembles the rotary power of the sterno-mastoid, but with this important difference, that, whereas the sterno-mastoid rotates the chin towards the opposite side, the inferior oblique (for this is the rotatory muscle chiefly concerned) rotates the chin towards the same side, in antagonism to the rotatory power of its sterno-mastoid fellow. Thus, were we dealing with a contraction of the right sterno-mastoid, the simultaneous contraction of the left inferior oblique would intensify the resulting rotation, and would render the return of the head to the antero-posterior plane a more difficult matter.

Torticollis due to muscular contraction may therefore be of a very complex nature, and the determination of the exact muscles involved may be extremely difficult.

It is not, however, always the result of muscular contraction or shortening. Exceptionally, the head deviates from its natural position because of actual loss of substance in the supporting vertebral column, the result of inflammation, or the subsequent contraction of cicatricial bands, resulting from the healing of extensive granulating surfaces (as in burns) that, passing from the lower parts of the neck upward to the inferior maxilla, or the skull behind, produce abnormal positions, which may or may not resemble the position of torticollis, but the consideration of which does not at present demand our attention.

Torticollis may be congenital. Such cases occasionally present themselves, and their exact cause has given rise to much discussion. Whether the deficiency in length of one of the sterno-mastoids is due to some abdominal intra-uterine position, or to a hæmatoma, situated in the muscle itself, as a result of undue traumatism during labor, or to some actual deficiency in embryological development, has not been fully determined. Of these different factors, the first two have been so ably discussed by Stromeyer, Petersen, and Lorenz, as to need no further remark. In support of the theory of deficient development, it may be stated that the study of practical anatomy affords numerous illustrations of the lack of muscular symmetry.

To be sure, this is more frequently seen in muscular anomalies, but that this is not always the case is proven by the fact that even such a large and constant muscle as the pectoralis¹ major may be very rudimentary on one side of the body, while the opposite muscle will be perfectly normal.

In the neck muscular variations are frequently encountered, and it is certainly conceivable that the sterno-mastoids² may thus be unequally developed.

The actual pathological condition of congenital torticollis, no matter what the precise cause, consists in an inequality in the length of the sterno-mastoid muscles, secondary to which is developed a scoliosis in the cervical vertebræ, with an asymmetry of the soft parts, cartilages, and rarely bones of the corresponding half of the face; secondary, because the restoration of normal length to the affected sterno-mastoid allows the return of the head to its normal position, while both facial atrophy and scoliosis disappear.

But although the actual shortening in these congenital cases is the most conspicuous and sometimes the only change in the muscle, yet in other cases there is also present the element of contraction, either spasmodic or constant, which, as we shall mention later, materially changes the muscle substance or cervical fascia or both. Usually the latter, which is the first to take place, is more marked and leads to the formation of thickened, contracted bands of connective tissue, that should be divided in operations for the relief of this condition.

Secondly, torticollis may be acquired. This is due to some factor that, by its irritation, results in a spasmodic contraction of the sterno-mastoid muscle, followed by a similar contraction of the deeper muscles that move the head on the vertebral column, the contractions being intermittent in character, and, according to the severity of the case, being separated by longer or shorter

¹ Dr. Huntington tells me, that, comparatively recently, one example of complete unilateral absence of pectoralis major, pectoralis minor, and latissimus dorsi, has been observed in the dissecting room of the college.

² This is rare in the mesial line of the body, but is especially apt to occur where, in the embryological development of the body, the lateral arches join. In the neck this line of union corresponds to the position of the sterno-mastoid muscle.

intervals of time. Between the attacks the head is held in the characteristic position, and the onset of a paroxysm is marked by an exaggeration of the deformity and by severe pain.

In the majority of cases this contraction seems to be entirely of a reflex nature, independent of the patient's will, uncontrollable, the origin of the impulse being some irritation, such as an inflammatory process in the immediate vicinity of the sterno-mastoid or trapezius muscle, or of the joints moved by them.

This condition is of frequent occurrence in cervical adenitis. Long chains of glands are situated beneath the sterno-mastoid, and when for any reason these become the seat of inflammation, torticollis frequently results. In these cases, when, by therapeutical measures, the adenitis after a short duration subsides, the torticollis generally disappears.

But the cause of this trouble is not always so easily recognized, nor does the subsidence of the torticollis always yield readily to simple therapeutical remedies ; and it is precisely in this class of cases, after local applications to the muscle and internal treatment have failed, that surgical interference is required, with the object of breaking "the circuit," by which "the current" producing these painful contractions travels.

As yet, no localized inflammatory condition, situated in that part of the central nervous system and upper spinal cord from which the spinal accessory and motor filament of the cervical plexus take origin, has been established as a cause of this condition. Neither has spasmodic torticollis been definitely connected with any pathological lesion in the high cortical centres of motion, nor has it been attributed to any abnormal change in the centrifugal nerves that supply the muscles affected. Repeated operations have been reported in which a portion of the spinal accessory nerve as well as the post-cervical nerves have been removed, but in no instance has the writer found a statement of a subsequent microscopical examination of the segment or segments of nerves thus taken away. Such examinations should be made with a view of determining how much, if ever, diseased nerves may be ascribed as a cause of this condition.

Spasmodic torticollis, clinical evidence shows, is a disease

in which at first but one muscle, and that usually a sternomastoid, is involved. This is followed, however, by the contraction of other deeper muscles in the neck until, in advanced cases, but few exist that do not take part, more or less, in the production of the deformity. Hence spasmodic torticollis may be said to have a distinctly progressive character. This is of importance in considering the pathological changes that occur in the muscles as well as in some of the other tissues of the neck as a result of these intermittent, painful contractions; for, although, in the early stages and in cases of short duration, no such changes can be detected, still, if the progress of the disease continues unchecked, the muscles and their fascial investments will be altered to such a degree as to cause one of the most obstinate forms of torticollis, which it is very difficult to cure. In these most advanced cases the abnormal position of the head is extreme, even during the intermissions in which the patient is free from paroxysms, and even the relaxation caused by an anæsthetic will not ameliorate the deformity. Nor is it the simple shortening of the muscle that occurs in the congenital cases, because in them the shortened muscle is normal in its histological features, while with these advanced cases the muscle, both in its gross appearance and under the microscope, shows very marked changes.

Vollert has shown the presence of connective tissue between the individual muscular fibres, which, in the mildest cases, is absent or slight in amount, but which, in severe forms, may exceed in amount the remaining muscular fibre. Not only in the muscle itself but also in its sheath are changes very marked. This portion of the cervical fascia is thickened to a remarkable extent by an increase in the connective tissue, of which it is normally composed, while subsequent changes of contraction, common to all new connective-tissue formations, result in the formation of tense bands that pass in front and behind the muscle over the vascular sheath, and these bands, while exaggerating still further the deformity, render it possible to accomplish its cure only by their careful and thorough removal.

With this understanding of the subject, we may proceed to the consideration of the different surgical procedures applicable to the various groups of cases that we have described.

The indication to be accomplished in the congenital cases is clearly defined. The shortened sterno-mastoid muscle must be lengthened, until it equals the length of its fellow-muscle. This is most easily accomplished by dividing the tendon of the muscle at its sterno-clavicular attachment. When divided, the head can readily be brought into a normal position and held there by suitable orthopædic appliances, until all danger of subsequent contraction has passed. In what way is this tenotomy to be performed?

The subcutaneous division of the sternal head has been a favorite operation, and is accomplished by making a small opening near the inner prominent part of the tendon, through which is introduced the firm blade of a tenotome, either between the muscle and the skin or between the posterior surface of the muscle and the deep cervical fascia. In both the edge of the knife is turned towards the muscle, which is divided by a succession of sawing movements, until the complete division is shown by a sudden snap of the yet unsevered portion of the tendon.

This operation has many adherents, is still much in vogue, and it certainly yields good results. Some surgeons divide the tendon from before backward, and others divide it in the opposite direction. The latter method is favored by the majority because the danger of important vessel-penetration ceases after the knife, introduced along the easily-felt edge of the tendon, has been turned against the surface of the muscle, while these same vessels, by the other method, are more apt to be wounded when the knife, after dividing the tendon, comes suddenly in contact with the vascular sheath before it can be withdrawn. This, in fact, comprises the only danger, besides possible infection, a danger that is not of a "theoretical" nature, for cases where even the internal jugular vein has been wounded have been reported by candid surgeons, and although not necessarily a fatal accident, still, of course, it exposes the patient to the risks of hæmorrhage and of entrance of air into the vein.

Consequently, the open operation, when the tendon is exposed by a transverse incision and carefully divided under the surgeon's eye, is preferred by many, and is especially desirable in

those congenital cases in which a certain amount of spasmodic or constant contraction of the muscle indicates the beginning of thickened cervical fascia. Here the accurate introduction of the tenotome behind the tendon would be difficult, as the line of demarcation between the deep fascia and the posterior surface of the muscle would not be sharply defined and vessel-penetration would be difficult to avoid, whereas, if the muscle were divided from before backward, a tense band of fascia undivided might still prevent the full reduction of the deformity and induce the operator to continue dividing the resistant bands until the head could be brought into a normal position, with considerable risk of damage to an important vessel.

Schwartz, an advocate of the open method, reports a case in which a subcutaneous operation would surely have wounded the internal jugular vein, or, if not, would have left undivided a cicatricial band, which tightly embraced the anterior surface of this vein, and which prevented complete reduction of the deformity. By means of the open operation this band was easily divided without injuring the vein, and a good result was obtained.

It would appear, therefore, that where the division of the sterno-mastoid tendon was indicated, the subcutaneous operation could be safely performed if the muscle were simply shortened; but, on the other hand, that the open operation is indicated where the presence of any spasmodic or constant contraction would render the surgeon likely to encounter cicatricial bands of greater or lesser density, which would require division.

Spasmodic torticollis, advanced and long existing, cannot be treated successfully by simple division of the sterno-mastoid tendon. To be sure, by this means temporary relief would ensue, and in a minority of cases a cure would be effected, for the reason that when the divided tendon had united in such a way as to resume its function, the exciting cause might have disappeared, perhaps entirely, perhaps subsequently to return. Hence operations on the tendon itself for the relief of spasmodic torticollis do not yield entirely satisfactory results. If, however, the path of the impulse producing a painful contraction be interrupted by a surgical procedure on the nerve that supplies it, "the

circuit will have been broken" in a more favorable "section," and the relief to the patient will, if temporary, be of longer duration, and not infrequently a permanent cure may be expected.

For this purpose the spinal accessory nerve has been exposed in at least two different ways, and has afterwards been subjected to a variety of procedures.

The nerve may be reached by an incision three inches in length, along the middle portion of the posterior border of the sterno-mastoid muscle. After its posterior edge is exposed search is made for the nerve, as it leaves this muscle near its centre to terminate in the trapezius after crossing the occipital triangle of the neck. The nerve when found is followed carefully through the muscle until that portion of it which lies between its point of exit from the skull and its point of entrance into the muscle is exposed, and in this situation it is subjected to some suitable surgical procedure.

This method of reaching the nerve is certainly utilized by comparatively few surgeons. Its only advantage is its safety. There is no region in the neck in which an incision may be made with less risk, so far as wounding of important structures is concerned, unless, perhaps, the anterior median line of the neck, and here, certainly, the incision cannot be carried to any considerable depth without the exercise of due care and attention.

Its disadvantages, however, are multiple. Even when that portion of the nerve, after it has emerged from the sterno-mastoid muscle, is well developed, it is not an easy matter to distinguish it from descending branches of the cervical plexus to the trapezius, for not only is it as it crosses the neck parallel to these nerves, but also a free anastomosis between the spinal accessory and the second cervical nerve, at the edge of and beneath the muscle, still further renders its detection difficult. Nor is its identity revealed by mechanical or electrical methods of stimulation, for several of these descending branches of the cervical plexus would, if subjected to the tapping of a scalpel, or to the more scientific electric current, result in a contraction of the trapezius, in precisely the same way as the spinal accessory, under similar conditions, would behave.

Another objection consists in the fact that this part of the spinal accessory is not always well developed. The writer recalls instances in the dissecting-room where, after supplying the sterno-mastoid, only a minute filament could be traced into the cervical plexus so small as to surely escape detection in any surgical procedure, while the trapezius was apparently supplied altogether by the cervical plexus. Certainly in these cases, as well as in others more numerous, where the terminal part of the nerve instead of being practically absent was very small, it would be very difficult to find the nerve in this part of its course.

Another variation of interest to which the nerve is subject, and which, if present, would confuse one who was searching for this structure through the posterior incision, is its failure to penetrate the sterno-cleido-mastoid muscle.

In two instances within the present year the nerve of considerable size passed entirely underneath this muscle, giving to it only a small branch, which left the parent trunk just below the posterior belly of the digastric to enter the muscle in the usual place.

The operation in which the nerve is reached by an incision along the anterior border of the muscle is more generally employed. This procedure is, unlike the other, not absolutely free from risk. Neither is the detection of the nerve always easily accomplished, although in the end it is absolutely certain to be found, and usually not after a prolonged search.

For these reasons, through the kindness of Dr. G. S. Huntington, professor of anatomy in the College of Physicians and Surgeons, the writer was enabled to make a series of dissections for the purpose of establishing, if possible, some guide or method of procedure by which the nerve could readily be exposed, and with the least risk to the patient.

The incision should be generous, for the nerve is situated at a considerable depth, and should extend from the mastoid process above downward to one or two inches beyond the angle of the jaw. The anterior edge of the sterno-mastoid should then be exposed. In the upper part of the wound the posterior and inferior portion of the parotid gland may have to be drawn for-

ward, although usually it does not overlap the muscle. When this is done, it is comparatively easy to expose by blunt dissection the transverse process of the atlas, as it lies directly below the mastoid process above, while immediately in front of this bony prominence, and running downward and forward from the mastoid process towards the angle of the jaw, is the posterior belly of the digastric. Behind this lie the main vessels of the neck with the spinal accessory nerve emerging from the jugular foramen, and the operator is certain that no harm can be done to these structures as long as he remains superficial to the digastric belly, which in its turn lies at a considerable depth,—in fact, at about the level of the transverse process of the atlas.

Owen and Petit have drawn attention to the fact that the nerve usually enters the mastoid muscle at a point opposite the angle of the jaw. I have found, however, in a large majority of cases that, on leaving the internal jugular, it assumes a definite relationship with the transverse process of the atlas. Never above it, sometimes directly over it, usually a fraction of an inch in front of its most prominent part, the nerve may easily be detected in the small amount of connective tissue that envelops it, and from this point to its entrance into the belly of the muscle it may be isolated with safety, and treated by any suitable procedure. If, exceptionally, it should escape detection, the anterior border of the muscle should be drawn sharply backward at a point opposite the angle of the jaw, the nerve in this way put on the stretch, and by blunt dissection in the adipose tissue that separates the under surface of the muscle from the sheath of the vessels, the nerve may readily be exposed. Usually the nerve passes from under the posterior belly of the digastric, at a point just in front of the transverse process of the atlas, to a point on the deep surface of the muscle just behind its anterior margin opposite the angle of the inferior maxilla. It is sometimes accompanied by a small artery and vein, the latter easily visible, the former a branch of the occipital. Rarely the nerve lies at a considerable distance from the transverse process of the atlas; in one case as much as half an inch anteriorly. Here the nerve could be found at its entrance into the muscle, the landmark of the transverse process having failed to localize its situation.

The risks of the operation really are few. Some writer calls attention to the fact that the external jugular may give rise to troublesome hæmorrhage after the incision through the skin, but such an incision only affects, in its uppermost part, the radicles of the vein, which, as is well known, quickly crosses the superficial surface of the muscle, in company with the auricularis magnus nerve, and the resulting hæmorrhage can easily be controlled. Damage to the internal jugular is possible, but if, after exposing the posterior belly of the digastric, blunt dissection is alone practised, such an accident cannot occur.

The occipital artery, as it passes upward above the transverse process of atlas to the mastoid process, usually lies in front of the nerve. In the majority of dissections this vessel lies *behind* the belly of the digastric, and hence is not seen. Its branches to the sterno-mastoid are divided, but the hæmorrhage, although troublesome, is easily controlled. Rarely the artery lies at a lower level, and passes below the transverse process, when it might be divided. If the incision is ample, there is no difficulty in securing the divided ends.

The facial is the only important nerve that lies near the field of operation, but this comes no nearer than the superior border of the digastric belly, and, therefore, is not liable to damage.

Mention has previously been made of the fact that inflammatory processes in the vicinity of the muscle may lead to the development of spasmodic torticollis. Such processes very frequently involve the deeper cervical lymphatic glands, and of these the enlargement of those that lie under and in front of the upper portion of the sterno-mastoid may increase the difficulty of the operation. These glands are situated in a capsule of adipose tissue, and dissection in this tissue can be carried on without fear of damage to the underlying vascular sheath, and usually the nerve is readily found running obliquely between the enlarged glands to the muscle.

After the nerve has been isolated in this way, different surgical procedures have been employed, with varying success.

Deaver, in a case of traumatic origin, ligated the nerve with silver wire, which remained encysted in the wound. Primary union followed, but the subsequent result is not mentioned.

By others the nerve has been simply stretched. Smith reports a case of sixteen years' duration, in which the procedure was followed by temporary improvement. But this usually is of short duration, and in this particular case was followed in one week by excision of a portion of the nerve one-third of an inch in length. Absolute paralysis of both sterno-mastoid and trapezius resulted.

Gould reports a case in which, during the process of stretching, the nerve gave way. Subsequent traction resulted in the removal of a delicate strand, representing the spinal portion of the nerve. This method of "nerve-avulsion" was followed by no unfavorable symptoms, and at the end of a year the patient, who prior to the operation had been a sufferer for eight years, showed no tendency to recurrence.

Usually the excision of a portion of the nerve is preferred to any of the above procedures. The segment removed should be from one-third to one inch in length. Complete paralysis of the corresponding sterno-mastoid and trapezius muscles followed this procedure, in the case reported by Smith, and in another similar one, reported by Griffith and Halwell.

There is no doubt, therefore, of the immediate relief which the patient obtains as a result of this operation in a case of spasmodic torticollis in which these muscles are involved, and in a considerable number of such cases this relief is permanent. It must be remembered, however, that frequently the deeper muscles of the neck, supplied, not by the spinal accessory, but by branches of the posterior cervical plexus, are involved, and that, naturally, the contraction of these muscles would not theoretically be affected by division of the spinal accessory nerve. It is an interesting fact to observe, however, that such division has been followed by temporary amelioration in the contraction of the splenius capitis and adjacent muscles of the opposite side, although this improvement lasted only three or four days.

In order to effect a cure in those cases in which torticollis is produced by contraction of the deep posterior muscles, the nerves which are distributed to these muscles must be exposed

and divided. This is best accomplished by division and excision of the posterior nerve-roots as they issue from the intervertebral foramina; a procedure that was originated by Keen, and which, since then, has been done by other surgeons. The roots themselves must be divided, because, shortly after its emergence from the spinal canal, each nerve, with the exception of the first or suboccipital, divides into an external and internal branch, the former muscular, the latter principally cutaneous. The division of the roots thus insures the division of the motor portions of these nerves. This procedure has yielded excellent results, although the short time in which it has been practised has not been sufficient to form an accurate estimate of its worth.

In the case previously cited, in which Smith stretched and subsequently excised a portion of the spinal accessory nerve, the spasmodic contractions of the deeper muscle still persisted. Five weeks after the excision of this nerve the posterior divisions of the upper cervical nerves, with the exception of the suboccipital, were divided and a complete cure was accomplished. Two years after this last operation the patient had not had any recurrence of his former trouble.

A similar and equally brilliant result is reported by the same writer, in another case, where two years had elapsed since the operation was performed, and the patient continued well.

It seems, therefore, perfectly justifiable to reach the conclusion that, in cases of spasmodic torticollis, where non-operative procedures of treatment have failed, a portion of the spinal accessory nerve should be excised; in some cases this is sufficient to effect a cure, especially when the painful spasms are due to contraction of the sterno-mastoid and trapezius muscles; that, in other cases, when, in addition, the deeper muscles are involved, the posterior cervical nerve-roots should be excised close to their origin from the spinal canal on the affected side, and that this procedure will certainly, in the majority of cases, be followed by a permanent cure.

As yet no cases have been reported in which the posterior cervical nerves have been divided before the spinal accessory. It has been stated that the prior division of this latter nerve is fol-

lowed at the time by a temporary improvement in the spasmodic contractions of the deeper muscles. It is among the possibilities, however, that the disease may originate in this latter situation, and it would be very interesting to see what effect primary division of the post-cervical nerves might have upon a coexisting, but subsequently developed, spinal accessory irritation.

We have still to consider the treatment of those cases of torticollis in which, from the long period through which muscular contractions have persisted, a permanent shortening, not only in the sterno-mastoid muscle but also in other deep muscles of the neck and in the deep cervical fascia, takes place. These changes have been previously described and need not again be repeated. In addition, however, the patient is subject to attacks of spasmodic contraction of the affected muscles, resulting in great pain and still greater distortion of the head. This latter condition can be treated by division of those nerves that innervate the affected muscles, but this procedure does not relieve the deformity due to the mere shortening of the muscle or muscles, which becomes more and more aggravated by the continued and uninterrupted contraction of connective-tissue bands, which infiltrate both muscle and deep cervical fascia.

In this class of cases it is necessary to remove the cicatricial bands that prevent the head from assuming its natural position, wherever they exist, and this, naturally, can best be accomplished by an open operation in which the region of the neck in the vicinity of the sterno-mastoid muscle is thoroughly exposed by an ample incision along the anterior border of the muscle, from the lower extremity of which a transverse incision extends for several inches parallel to the upper border of the clavicle. The offending bands of fascia, together with that portion of the sterno-mastoid that has permanently been altered, is carefully dissected and removed. When the operation is completed the position of the head should be brought into the median line, and should be held in place by a suitable orthopædic apparatus.

In the less severe forms of this type of the disease such a radical procedure as that just described will prove successful. Even in the extreme cases, where a perfect result cannot be ob-

tained, a certain degree of improvement, the greater, the more radical the operation, will be certain to ensue.

Volkman reports several cases in which the procedure was followed by a cure, and in these cases microscopical examination of the muscle removed showed a great amount of connective tissue distributed through its substance.

It is certain that by no other procedure could a cure be accomplished.

In conclusion, the writer wishes to emphasize the importance of subsequent orthopædic treatment. Reference to this has already several times been made, and it only remains to state that when by operative measures the head is brought into the median plane again, it must be kept there by the wearing of a splint that will hold it firmly in place, and will, by giving perfect rest, favor the complete and rapid union of the wound. That such union should be primary is of the greatest importance. Secondary union would be attended by the formation of cicatricial tissue, the subsequent contraction of which would be difficult to govern.

By means of suitable apparatus is not only a tendency to recurrence prevented, after complete union has taken place, but by its assistance the stretching of bands of fascia that have escaped the surgeon's knife is accomplished, and in this way all tendency to subsequent trouble from this source is averted.

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REPORT OF ADDITIONAL CASES OF INTRA-CRANIAL NEURECTOMY.

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IT was my fortune to be able to report four cases of intracranial neurectomy in the ANNALS OF SURGERY, January, 1894. Since that time I have operated upon three cases. The method pursued in the last three cases is essentially that mentioned in the article stated; and I have numbered them in sequence with those already reported. The sum total is seven cases, all recovering from the operation, and all with no recurrence of pain up to the present time, so far as I can learn.

The diagrams which accompany the cases now reported are of the same size as those reported a year ago, in order that comparison may be the more easily made. It is not possible at the present time to speak *ex cathedra* as to the expediency of the operation in question, or the probable outcome thereof,—the results are not at all similar, and sufficient time has not elapsed to show the ultimate result.

CASE V.—E. M., white, male, aged seventy-six years, a farmer, suffered from neuralgia in an area corresponding to the distribution of the second division of the left trigeminal nerve. In June, 1890, the left infra-orbital nerve was divided where it appears upon the face. Eighteen months of relief followed, and then gradually pain returned; now it is extremely severe and almost constant. Neither the first nor third divisions are affected. Morphia in large doses gives relief, but no other drug.

Operation March 22, 1894. Anæsthesia was induced by chloroform. I opened the head and removed the second division of the

left fifth nerve from the foramen rotundum to the Gasserian ganglion, which latter was exposed and carefully left intact. Oozing of blood from the upper part of the wound required gauze pressure, which was removed on the second day and the incision closed. All went well and the patient left hospital April 17, 1894.

Pain ceased from the time of operation. Anæsthesia exists over the upper lip, skin, and mucous surface, incompletely of nostril, skin, and mucous surface. The skin from the infra-orbital foramen to the angle of the mouth is anæsthetic. The mucous membrane lining the left cheek has diminished sensibility, but not entire abolition of the same. No loss of taste; thermic sense normal.



FIG. 1.—Showing areas of anæsthesia in Case V.

CASE VI.—L. M., white, widow, aged sixty-nine years, the mother of several children, gave the following history:

Twelve years ago, without premonition, she experienced an acute sudden pain in the face over the right upper jaw, which lasted but a moment. She thought she had received a blow. No swelling, no discoloration of the skin, or other evidence of traumatism appeared. Several months later a similar pain was felt. In the course of the following year the paroxysms of pain became longer and more intense, the intervening periods of time more and more short, until the patient

was reduced to a condition of almost constant suffering. A paroxysm was induced by talking, swallowing, pressing the tongue to the roof of the mouth, etc.

Before coming into my hands nitro-glycerin, quinine, gelsemium, aconitia, salicylate of soda, and other drugs had been used without permanent relief; morphine was being taken in doses sufficient to abate pain; the patient, being aware of the unhappy results consequent upon the opium habit, had recourse to the drug as sparingly as possible.

Surgical relief had been sought. The upper jaw nerve (right) was divided below the orbit in September, 1889, and electricity used; ten months of relief from pain followed. In September, 1891, the lower jaw nerve (right) was divided, judging from the scar behind the upper part of the ramus; saliva is said to have flowed from the wound during several weeks. Relief from pain for sixteen months was obtained by this second operation.

The patient came under my care May 2, 1894. There was present the excruciating pain usual in cases of advanced trigeminal neuralgia; the territory affected was that supplied by the second and third branches of the fifth nerve (right). The tongue was not involved, but the act of swallowing was agonizing; talking induced a paroxysm, as did handling of the area mentioned; the patient had lost much flesh, yet no cause was found for the same except the voluntary starvation undergone by the patient as preferable to the pain induced by deglutition. The teeth in both upper and lower jaws (right side) had been extracted hoping to afford relief from suffering, —needlessly, it is scarcely necessary to add.

There seemed to be no reason for delay, so after a week of preparatory treatment (May 9, 1894) I operated. Anæsthesia was induced by chloroform. I again found that opening the dura allowed a free escape of cerebro-spinal fluid and permitted exposure of the organs sought. The intracranial portions of the second and third branches of the fifth nerve were removed together with the lower portion of the Gasserian ganglion, all in one piece. The upper portion of the ganglion was not touched.

The patient went to operation with pulse 84, respiration 24; left the operating table with pulse 100, respiration 28; during the evening the pulse remained 100, respiration falling to 24. All went well. Dressings were changed for the first time on the tenth day, the wound then was firmly healed and dry; stitches were

removed and a little absorbent cotton placed over the seat of operation to avoid a possible shock from blow, etc. The patient went home June 7.

Pain ceased from the moment of operation; swallowing, handling, etc., were absolutely painless; the patient gained flesh and spirits. The area of cutaneous anæsthesia is shown in the figure, which can with advantage be compared with those in the article alluded to. It is much larger than in any case yet coming under my observation, and may be due to a division of nerves passing on to the face from the neck, which had been severed by the incision made for



FIG. 2.—Showing area of anæsthesia in Case VI.

the purpose of exposing and cutting the lower jaw nerve. Just within the area of anæsthesia, along a line marked by crosses, cold was recognized as cold, while heat was recognized not as heat but as motion; the patient always said not "you are touching me with something warm," but "you are scratching me."

The mucous membrane of lips, cheek, soft palate, and upper pharynx (right side) was anæsthetic. The surface of the tongue as far back as the foramen cæcum was anæsthetic, perhaps farther, but of this I am uncertain. Taste on the tongue held outside the lips was

abolished; taste within the mouth seemed normal, the substance to be tasted being diffused, of course.

The right anterior half of the occipito-frontalis was paralyzed, also the corresponding corrugator supercilii.

The muscles of mastication supplied by the divided branches of the fifth were paralyzed.

CASE VII.—S. S., white, male, aged sixty-three years, married, several children, entered hospital December 11, 1894.

In 1890 he suffered from right facial neuralgia, and the infra-orbital nerve was excised. The relief which followed lasted nearly one year, when recurrence took place. At the present time pain very severe is felt in the right temporo-maxillary region, paroxysmal in character. The spot of greatest intensity is over the zygoma one inch in front of the ear, thence the pain radiates over the head, etc., but does not involve the territory tributary to the first division of the fifth nerve. The paroxysms vary in length from a few minutes to half an hour. Talking, swallowing, and handling the face induce pain, but changes of weather do not. All teeth on the right side, upper and lower jaws, have been extracted in the expectation of obtaining relief from pain. The patient had undergone treatment by drugs, so after a week of preparatory treatment, December 19, 1894, I resected the second and third divisions of the fifth nerve, together with the adjacent portion of the Gasserian ganglion. Anæsthesia was induced by chloroform.

The bone was chiselled through, and, not giving as much room as was desired, rongeur forceps were used and the opening made larger. The bone was not replaced. The dura was opened, cerebro-spinal fluid evacuated, the dura and brain raised, and the operation completed. The middle meningeal artery was not interfered with, nor was it in the way. To raise the dura from the bone I used a piece of absorbent cotton (sterile) held in bullet-forceps and wrapped around the ends of the forceps. I had less trouble than ever before, the cotton diminishing oozing as the separation occurred. Much venous blood came from the inner surface of the skull above the opening, I having torn a vessel passing between dura and diploë. I pressed into the cranium enough gauze to stop the bleeding, and closed the wound in the anterior half. A voluminous dressing was then applied. The patient came from the operation-table with good pulse and respiration. Thirty-six hours later I removed the gauze packing, and closed the wound by suture, save at the lower posterior angle, where I placed a

small shred of gauze. Two days later, December 22, the patient's temperature rose from normal in the morning to 103.4° F. at 2 P.M., and from this time until January 5 the temperature fluctuated from normal to 102° F., the pulse and respiration remaining normal. There was some pain in the head, and two or three times bleeding from the nose. High temperature with normal pulse and respiration suggests the administration of an antiperiodic, so the patient was given quin. sulph. gr. five every four hours, beginning December 23, and continuing until December 28 without result. Until January 4 no quinine. Commencing January 4, Warburg's tincture was given



FIG. 3.—Showing areas of anæsthesia in Case VII.

in drachm doses every four hours, and there was no subsequent rise of temperature above normal. December 31, all stitches were removed, the wound being healed, and January 14 the patient returned home.

The area of cutaneous anæsthesia is shown in the diagram. The right half of the tongue and palate and inside of cheek are anæsthetic, the right side of forehead cannot be thrown into wrinkles, the right muscles of mastication supplied by the fifth are paralyzed, taste on the tongue held outside the mouth is not lost, the difference between heat and cold is not recognized upon the face and tongue in the anæsthetic area.

Comparing my seven cases, it would appear as if the middle meningeal artery is divided only when it passes through a foramen or very deep groove in the parietal bone ; it does not appear to be in the way or to interfere with access to the foramen ovale, notwithstanding the fact that Taylor's measurements may suggest such a condition of affairs. In no case have I found it in the way at its entrance to the skull, although running as a pulsating tube in the dura from the foramen spinosum. The opening of the dura and evacuation of cerebro-spinal fluid is a procedure followed by very great benefit ; the later steps of the operation become vastly more easy. It is to be noted that many operators have torn accidentally the dura, and so given exit to cerebro-spinal fluid by accident ; should this not have occurred, it is unquestionably right that the dura should be cut, and cerebro-spinal fluid allowed to escape. In my last four cases this I have done, and have not taken the trouble to sew up the dura afterwards, considering that the minute hole would take care of itself,—as has been the case.

The anæsthetic agent in all my cases has been chloroform ; the age of the patients, but, especially, the desire to avoid congestion of the face and head, so often seen with ether, has induced me to choose this anæsthetic.

In looking at the diagrams it will be seen that the face anæsthesia varies greatly, it not being so extensive as to cover the territory supplied by the fifth nerve,—its divided divisions. This is probably due to the presence of sensory nerves, which pass from the neck to the face. This is particularly noticeable in Case VI. The persistence of the anæsthesia is, of course, to be considered. This probably diminishes, both in extent and intensity, although I am not at present prepared to give the exact statistics in regard to my patients. I propose later to publish more accurate diagrams in regard to this.

Distinct from the anæsthesia, however, is to be considered the pain, because face anæsthesia and pain do not necessarily go together. In a certain number of cases, there is, I believe, no doubt about the fact that face sensation may remain or be present soon after the division of the nerve, yet pain be abso-

lutely wanting. One of Keen's cases shows this, and Dandridge's case shows it also. In a case of upper jaw neuralgia in which I did Carnochan's operation eleven years ago, in October, 1894, there is absolutely no pain, yet perfect face sensation. In no case have trophic changes been noted in the area of the fifth nerve after operation, the supraorbital region being in no wise different from the skin of the face, save what was normal, and in one of my cases, No. 3, the skin, from being harsh, returned to a healthy condition.

Taste deserves mention. Of the five cases in which the second and third divisions and adjacent ganglion were removed, three show persistence of taste, two absence of taste. Taste was tried with sugar and salt. In three of the same five cases the patients could recognize the difference between heat and cold in the anæsthetic area. In two cases the thermic sense appeared to be absent. Of the cases in which the thermic sense was wanting, one retained taste, the other did not. The temperature in Case VII was extremely erratic, without corresponding elevation of pulse or respiration,—was it due to trauma of a heat centre? Of my seven cases, in two the second division only was severed. Their progress will be watched with interest, and compared with the other five in whom a portion of the ganglion was removed, as it may offer a means of arriving at a knowledge as to whether the ganglion is in fault or not. It is to be remembered that Carnochan laid great stress in his operation upon the removal of Meckel's ganglion, considering that the *fons et origo* of neuralgia. It remains to be seen whether the Gasserian ganglion deserves to be elevated into a similar position or whether it may be neglected. In intracranial neurectomy for neuralgia I am inclined to the opinion that its removal is expedient. The length of time during which absence of pain is to be expected—in other words, whether the operation is curative or not—remains to be found out. My first case was operated upon twenty-nine months ago; it remains absolutely well. The second case of which I have information, No. 3, was operated upon nineteen months ago; she remains well; and so with subsequent ones down to my last, in December, 1894.

In regard to the preservation of the motor root of the third division, I thought that I recognized it in one case quite certainly, as published in the article referred to, but I have not tried to save it since, thinking that no special advantage would be gained thereby.

It is proper to mention that there has come to my knowledge a case operated upon successfully, the patient recovering and the neuralgia not recurring. Two other cases have come to my knowledge in which the operation has been followed by death. And two cases have come to my knowledge in which, while the patients recovered from the operation, recurrence of the neuralgia has taken place. These cases doubtless will be reported, and it is not necessary that I should speak more fully of them now.

The microscopic appearances presented by the removed portions of ganglion and nerves will form the subject of another communication, the pathologist to whom they were submitted not yet being prepared to report.

CASES OF FRACTURE OF SPINE AND LAMINECTOMY TREATED IN THE ROYAL INFIRMARY,
NEWCASTLE-ON-TYNE.

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SENIOR SURGEON TO THE INFIRMARY.

CASE I.—J. B., aged eighteen years, "putter" in coal mine, admitted March 10, 1894.

On February 15 he was driving a pony drawing a tub of coal up a steep incline in the mine. When near the top the pony refused to pull any farther, and he went to the back to push; as he did so the chain became slack, the "cotterell" in consequence dropped out and released the tub, which then began to run back down the incline; unable to stop it he ran in front of it until, as it gained speed, it struck his back and threw him forward on his face. He lay unconscious for some minutes, and then got up and walked four or five yards, but was then compelled to lie down, owing to the severe pain in the back, but he was still able to move his legs. He was taken to the surface and then found he could not stand. He was carried home and put to bed. For twenty-four hours he could pass his urine, and then retention ensued. The anal sphincter was paralyzed from the first, and the small amount of power in his legs disappeared, with rapid wasting of muscles.

Condition on Admission.—He is a well-nourished, healthy, muscular lad. Temperature and pulse normal.

Spine.—At the lower part there is marked angular deformity, corresponding to the first, second, and third lumbar spines. Sphincter ani paralyzed, with complete incontinence of fæces, which are passed without being even felt. Bladder paralyzed; retention of urine.

Legs.—Muscles of thighs much atrophied; unable to flex thighs on abdomen, but can bring into action the sartorius and adductors. Muscles of legs wasted with marked pointing of toes.

Operation.—March 21, 1894. An incision eight inches long in the middle line, with its centre at the most prominent point of the deformity. Muscles separated on either side. The spine of the first lumbar vertebra was found fractured and detached. The spines of second and third were removed by bone forceps, and then the laminae of the first three lumbar vertebrae were cut through with chisel and mallet and removed, exposing the theca vertebralis, which was covered with

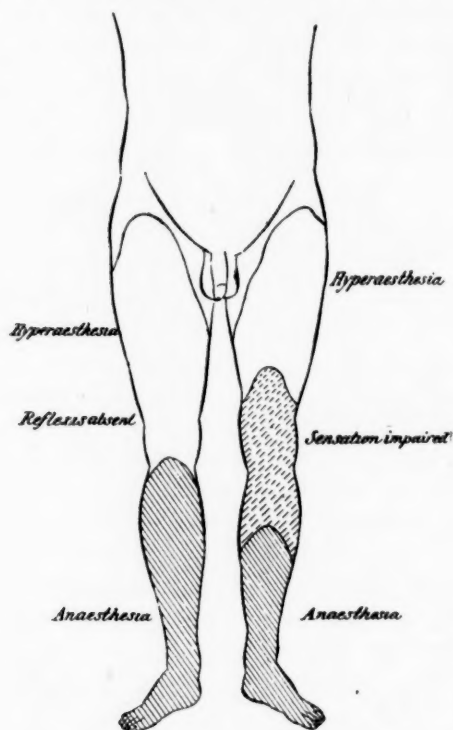


FIG. 1.—Showing area of disturbed or lost sensation in skin of Case I; all muscles paralyzed except sartorius and part of the adductors. Anterior view.

organized lymph; this was peeled off with dissecting forceps, freely exposing the membrane, through which the cord was seen pulsating. The wound was closed by deep and superficial sutures, and healed throughout by primary union.

Progress after Operation.—Patient rallied well. Improvement began almost immediately, and continued steadily in both legs, the

right leg always being a little ahead of the left. On April 19 there was marked increase in power in the right leg, which he could lift from the bed and bend the knee. The left leg improved, but to a less extent. Areas of anaesthesia rapidly decreasing. He can partially empty the bladder, and now feels a motion passing, but has no control. Reflexes still absent. On July 13 he walked out of the hospital. His gait at that time was shambling and rocking, not unlike that of a child with bad bow-legs; this might be partly caused by

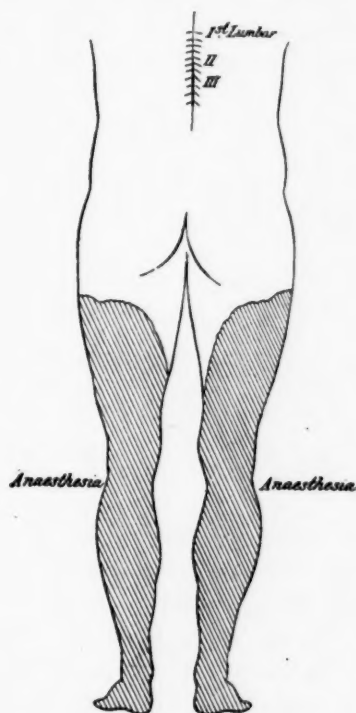


FIG. 2.—Case I. Posterior view.

the drooping of the foot from paralysis of the flexors. He had to watch his steps like an ataxic, and almost fell in the endeavor to "right about turn" as he walked.

The patient has shown himself from time to time, each time with decided improvement. On December 29 he walked from the station to the hospital, nearly a quarter of a mile, without help. He can sit down and rise with ease, and without help from his hands. His gait

is nearly steady and erect, very little shambling. Can "right about turn" without fear, but with feet in contact and eyes closed he falls. Power in all the muscles except the flexors of the foot, still some atrophy of calf-muscles, but the thighs are approaching their normal bulk. Cutaneous sensation complete. He has full control over bladder and rectum. He feels no weakness in the back, and has given up wearing his poroplastic jacket, as he found he did not require it.

CASE II.—J. B., aged thirty years; coal-miner; admitted July 19, 1894. While working in the mine was crushed by a fall from the roof, causing complete paraplegia. He lay for two years before he came to the hospital. He was for some weeks in the medical wards under the care of Dr. Philipson, and, although the case had a most unpromising aspect, his own wish to undergo an operation was acceded to.

State on Admission to the Surgical Ward.—Is very pale and emaciated. Has bedsores and cystitis.

There is an angular deformity in the dorso-lumbar region of the spine.



FIG. 3.—Special chisel for dividing laminae.

Lower Limbs.—All the muscles are extremely atrophied, with complete paralysis of motion and sensation. All reflexes are absent. Retention of urine and incontinence of fæces.

Operation.—July 20, laminae removed by a similar method to the preceding case, except that a special form of chisel was used (Fig. 3), which was found to facilitate the division of the laminae after they had been partly cut through with a saw. When the third lumbar laminae were removed the dura was found covered with fibrin; the cord did not pulsate. The laminae above were then cut through and removed, the dura being so firmly adherent that it was torn in two places. The cord here appeared as a flattened band, and, on introducing the finger into the canal, a sharp projection of bone from the posterior aspect of the body of the first lumbar vertebra could be felt crushing the cord, which did not pulsate.

Wound closed by deep and superficial sutures. Healing throughout by primary union.

After Progress.—Some collapse, but rallied well. The cystitis disappeared, but no other improvement took place.

CASE III.—H. R., aged thirty-three years; coal-miner; admitted July 17, 1894. Seven weeks ago, when at work in a stooping position, was crushed by a fall from the roof, supposed to weigh five or six tons. When dragged out he found he could not use his legs and had no feeling below the knees.

State on Admission.—*Spine*: first three lumbar spines prominent, with marked rigidity.

Legs.—Power in adductors fair. Flexion of right leg more complete than the left, and appears to be effected by adductors and sartorius, complete *paralysis of hamstring muscles*. Retention of urine and incontinence of feces, but he sometimes knows when bowels are acting.

Operation on July 24 by the same method as Case II. The spines of three upper lumbar vertebræ were found fractured. The laminae of two upper were removed, exposing the dura mater which was covered with fibrinous exudation, the cord appeared flattened and did not pulsate. The wound was closed as in the other cases, and healed by primary union.

After Progress.—Patient was much collapsed after the operation, but soon recovered. Some slight increase in muscular power was observed, but sensation was not improved.

Faradism and massage were employed without result, and when last heard of he was no better than before the operation.

CASE IV.—J. P., aged twenty-five years; laborer; admitted July 16, 1894. While at work at the face of a tall heap of artificial manure it fell on him, threw him backward and buried him. When he was dragged out, five minutes afterwards, he had acute pain in the small of his back, and had lost all power in his legs. He was at once brought to hospital.

State on Admission.—*Spine*: marked prominence of fifth, sixth, seventh, and eighth dorsal spines.

Legs.—Power in adductors and flexors of thigh good. Hamstrings and muscles of leg paralyzed, left weaker than right, with retention of urine and incontinence of feces. Patient refused operation, but some improvement took place. He could lift the legs from the bed and bend the knees, but no further improvement followed, and he went to his home in the country. He returned after a few months in the same condition, but the toes were becoming clawed and stiff. He still refused operation.

A review of these and other cases reported in the *ANNALS OF SURGERY* and elsewhere suggests some points for consideration.

(1) Where the case has not been submitted to immediate operation time seems to be an important element, the chance of recovery being lessened by delay.

(2) Pulsation in the cord. In none of the cases reported in the *ANNALS*, in June, August, and October, 1894, is that alluded to. Of my three cases of laminectomy the first was the only one in which that was seen,—it was carefully looked for in all,—and that was the only one attended with a really satisfactory result. If I were doing the operation again, and failed to get pulsation in the cord, I should certainly attack at least one arch above, and either remove it, or, after dividing one lamina, prize it up, so as to be sure there was no pressure.

(3) In none of the cases was the theca deliberately opened, as there did not appear to be any necessity for it or advantage to be gained. In Case II it was unavoidably torn and fluid escaped, but the wound healed as readily as in the other cases.

(4) The operation itself is not more dangerous than many others that are undertaken without hesitation. In all my cases there was some collapse, but they soon rallied, and all the wounds healed readily without suppuration.

For the notes of the cases I am indebted to the surgical registrar, Mr. A. M. Martin, and to my house-surgeon, Mr. W. E. Harker, to the latter of whom, as also to his predecessor, Mr. J. Braithwaite, I am indebted for that careful attention which greatly contributed to their rapid recovery from the operations.

THE DECIDUOMA MALIGNUM.

By GEORGE WILLIAM BEACH, M.D.,

OF BINGHAMTON, N. Y.

THIS name was given by Gottschalk, in 1893, to a variety of uterine tumor which, until that time, had been but little studied.

The same thing has been described by Köttwitz as a *malignant chorio-decidual tumor*; by Löhlein and Menge as a *deciduo-cellular sarcoma*.

Gottschalk also names it *chorio-decidual-cellular sarcoma*, and *sarcoma of the chorial villi*.

The French authors have united on one name, that of *déciduome malin*.

At the present day the etiology of this affection presents several questions which are not entirely explained, but we know that the deciduoma malignum merits a distinct place in pathology.

True, it is sometimes extremely difficult to make a clinical diagnosis in the early stages of the disease, but this is generally possible for the experienced gynæcologist. On the other hand, the microscopical examination invariably shows the giant-cells of the decidua mingled irregularly with smaller cells of most diverse form and size. These giant-cells invade the muscular fasciculi and vascular walls, and the original tumor rapidly forms numerous metastases in various other organs.

The first case was published by the late Professor Maier.¹ In this article the author presented two cases, one of which has not been considered by subsequent writers to belong to this variety of neoplasm.

¹ Virchow's Archiv, 1876, Vol. LXVII, p. 55.

The following year Chiari published three cases of primitive uterine tumors. The symptoms and clinical history were much the same in the three cases, and Chiari considered them as carcinomas, the evolution of which had been modified by pregnancy. It was not until years later, when comparing his histological specimens with those of Pfeifer, that he made the retrospective diagnosis of deciduoma malignum.

During the next eleven years the medical literature contained nothing new on this question.

In 1888 Sānger reported his case to the Gynæcological Society of Leipsic, which gave rise to an interesting discussion. Pfeifer and Müller reported their cases in 1890 and 1891 respectively; in 1893 Gottschalk, Löhlein, and Köttwitz added valuable contributions to this literature. In 1894 Nové-Josserand, Paviot, Klein, Jeannel, and Hartmann each published a case of deciduoma malignum.

Gottschalk speaks of three cases followed by post-mortem examination, which had been communicated to him by Professor Birch-Hirschfeld. These have never been published. I have tried to obtain further knowledge of them, but without success.

Sānger and Gottschalk, in Germany, and Nové-Josserand, in France, have done much to prove the distinct clinical and anatomical entity of this tumor.

In all we have sixteen cases to consider. If I do not speak of several doubtful cases it is intentional. For in a subject so new as this, one in which we have comparatively a great deal to learn, it is of great importance that we consider absolute facts and nothing else.

While attached to the staff of Professor Terrier, I had the good fortune to have under my care the case which was the subject of the report made by Drs. Hartmann and Toupet to the Société Anatomique de Paris, October 26, 1894.

The following are the clinical notes I took on this case :

Mrs. M. V., twenty-five years of age, a char-woman, was admitted March 23, 1894, in the service of Professor Terrier at Hôpital Bichat, Salle Chassaignac, bed No. 1. Menstruated at the age of

thirteen; always regular and without pain, rather scanty, lasting five to seven days. Married at twenty-three. Eighteen months ago she gave birth to a child after a normal pregnancy. She nursed her child until September last. She menstruated during the last six months of this time, but not in September, October, and November.

About the 15th of December the patient had an abundant metrorrhagia which lasted eight days, then diminished little by little, but without ever stopping altogether. No pain. The patient remained in bed the first few days only, and this was solely due to the abundance of the hæmorrhage.

Towards the first of March the metrorrhagia increased again, and this time was accompanied with chills. The patient then came to the outside consultation of the hospital; here she was advised to keep her bed.

After having followed this advice for a fortnight, and as her condition showed no change, she asked to be admitted to the hospital.

The first and second days there was no loss of blood, but the second night after her admission she was taken again with hæmorrhages. Believing it to be a case of endometritis due to an abortion, the cervix was dilated March 26, 27, and 28.

On the evening of the 28th the temperature, which until that time had been normal, rose suddenly to 40.3° . The tampon was taken out and some placental *débris* withdrawn. Two hours later the temperature went down to 38.2° . On the morning of the 29th the patient had a temperature of 40.1° . Dr. Malherbe performed a curettage, and that evening the temperature sank to 37.3° . Unfortunately, the pieces of placenta that were curetted received no histological examination.

April 7 the hæmorrhage came on again. This time it was very profuse, especially on the nights of April 17 and 18.

On the 18th a second dilation with laminaria was begun. The hæmorrhage continued, and became so important that on the 21st a tampon of iodoform gauze became necessary.

On the 23d the tampon was soaked through and renewed.

On the 24th it was found that the uterus had increased in size and rose above the pubis. To the left of the uterus was a tumor extending from the inner part of the internal iliac fossa into the pelvic excavation. This tumor was rounded, hard, and a little more sensitive to pressure than the uterus. Dr. Hartmann, Professor Terrier's

assistant, made a diagnosis of deciduoma malignum, and the patient was at once prepared for the extirpation of the uterus and tumors, which was to take place two days later.

April 25 the patient was taken with nausea and vomiting. I was called for the hæmorrhage which had become very profuse. The blood had soaked through the tampon and the sheets. I took out the tampon, and withdrew from the vagina several large clots of blood. One of these clots was closely united to a brownish mass of greater consistency. This mass was the size of a small orange, and had the general appearance of placental tissue. The patient fainted, while I applied a new tampon. An hypodermic of ether was administered. The vomiting continued and the patient had several syncope before eight in the evening. At this hour the pulse was rapid, but quite strong. The patient was sweating profusely, but there were no chills. The tampon was soaked through again. Ergot.

At 12.30 A.M. the patient was bathed in perspiration, but the temperature was not going down. Her face was drawn; lips bloodless. She complained especially of a buzzing in the ears. The nausea and vomiting had not ceased. Frequent fainting fits. The radial pulse was thread-like, and hardly perceptible. I made a transfusion of 1800 grammes of artificial serum in the right internal saphenous vein. The reaction was almost instantaneous. Better pulse. The patient became restless. At 3 A.M. she was still agitated. The hæmorrhage had continued. The patient died at 5 A.M. (April 26).

The post-mortem examination was made by Dr. Hartmann. Unfortunately it was impossible to make a complete autopsy, and nothing was removed except the uterus and its appendages.

There were slight signs of inflammation in the right tube and ovary. The left tube was distended by a collection of pus; it adhered to the side of the pelvic excavation and to the sigmoid flexure.

The uterus was enlarged. Upon examining it with the naked eye two rounded elevations about the size of hazel-nuts were to be seen on its surface. One of these was situated on the fundus, near the left angle, the other was still a little farther to the left on the posterior side. These two elevations were regularly hemispherical, rather whiter than the uterus, their surface was smooth. At their edges was a crown of fine arborizations, reminding one of those sometimes seen on the edges of cancerous elevations which have begun to invade the skin. Upon opening the uterus a blackish mass somewhat

like a piece of placenta could be seen hanging from the posterior wall near the fundus and the left angle. A section of the uterine wall showed that the exterior elevations were composed of a grayish-white tissue, quite uniform, pulpy, less consistent than the tissue of the womb, and allowing itself to be torn off in small fragments by the finger-nail. This tissue passed through the uterine muscle to the insertion of the black mass of which we have just spoken. Consequently this mass on the interior wall of the uterus sent out two cylinders, which parted from one another and terminated in the exterior elevations, thus forming a kind of Y.

*Histological Examination.*¹—The sections contain large nodules scattered through the entire thickness of the uterine wall, projecting even on the outside of this wall, but without breaking through. These nodules are round for the most part, they seem developed in the uterine veins, and in places where they are still small the vein walls, enlarged and distended, can be plainly seen limiting them. The neoplastic nuclei seem formed by the adjunction of arborescent vegetations starting with a slender neck, then becoming larger, stretching out and twisting more or less.

On examining one of these vegetations separately it is found to be formed by a central blood-vessel which serves as a kind of framework. About the vessel are grouped large conjunctive elements possessing one or two nuclei, easily colored with safranine; in some elements the nuclei are colored altogether, forming a small, highly-refracting mass, as in mortified cells. There are no conjunctive fibrils among these embryonic elements; the substance which separates them is amorphous and granular. Then, outside of these, come other elements of a special nature and extremely large, which form a kind of coating and assume different aspects. Sometimes can be seen a kind of continuous membrane of uniform thickness, often containing a considerable number of nuclei,—twenty and twenty-five without any cell boundaries. This aspect is that which is the most frequently observed in vegetations which have reached their period of complete development. Emerging from this membrane coating are secondary vegetations which appear under the form of protoplasmic masses, rounded or club-shaped when there is a free space before them, elongated and pointed when they enter a denser tissue.

These protoplasmic growths contain a great number of nuclei.

¹ Taken from the report made by Drs. Hartmann and Toupet at the Société Anatomique de Paris, October 26, 1894.

Under a powerful glass their edges are seen to send out amorphous, granular, thorn-like prolongations. These are veritable points of proliferation. When these growths have attained a certain size they hollow out a vascular cavity; then the outside membrane becomes denser, flattens out, and the embryonic elements come in between it and the blood-vessel whose walls invariably are very thin. Here and there these vegetations may reach an advanced state of development without an interposition of embryonic tissue between the vessel and the outside coating; in some parts of the tumor this variety predominates, the vegetations unite and form a kind of reticulum, the meshes of which are bounded by those bands of protoplasm containing numerous nuclei which constitute the coating of the larger growths.

When the preparation shows the extremity of one of the protoplasmic club-like expansions, it is easily understood how an immense giant-cell is found with a rounded form and containing forty or fifty nuclei; an analogous form may be found in other places, but without a central cavity. These different aspects can be easily explained. The vegetations which have developed inside the uterine cavity have the same structure as those that we have just described. The terminal expansions are simply larger, the outside coating is sometimes missing, and the surface is composed of embryonic tissues. Interstitial hæmorrhages are to be found in certain vegetations and also in some of the intraparietal nuclei. Nowhere on the surface of these villi can be found the columnar ciliated epithelium of the normal uterine mucous membrane.

On the contrary, the mucous membrane, examined at a place corresponding to a sub-mucous neoplastic nucleus, is found to be considerably thickened, and moreover presents villous prolongations which are often very long. The epithelium exists here and there on these prolongations; it is composed of a single layer of cells having their normal characters. The modifications of the mucous membrane are principally found in the sub-epithelial layer, which is quite thick and is composed of embryonic elements. In certain places the neoplastic nuclei are situated very near the internal surface of the cavity of the uterus, and it is probable that the masses protruding into the uterine cavity developed primitively in the thickness of the wall and later burst through the mucous membrane.

The invasion seems to be made by the vessels; in certain longitudinal sections of the uterine veins long villi may be seen which

occupy the lumen of the vessel ; in perpendicular sections the dilated veins are seen to hold a kind of granular coagulum with a large quantity of embryonic elements, then in the midst of this coagulum a giant-cell possessing ten or twelve nuclei. This cell seems to come from the section of one of those protoplasmic protuberances holding several nuclei, like those already described on the surface of the vegetations in the large nodules.

The nature of this tumor is very plain : it is a tumor composed of placental tissue, and if, moreover, we notice how much vitality belongs to this neoplastic tissue, how profoundly it infiltrates the uterine muscle, it is impossible not to see that we have here the characteristics of a malignant tumor ; thus the name of deciduoma malignum seems most appropriate to this variety of neoplasm.

Etiology.—All the authors who have studied this subject are agreed on one point,—that there is an undeniable relation between the deciduoma malignum and pregnancy. In one instance (Maier's case) the tumor was developed with the foetus, and with it was expelled from the uterine cavity. In all the other cases (except Paviot's) the neoplasm seemed to begin immediately or shortly after childbirth or an abortion.

In Paviot's case alone there seems to have been no pregnancy among the woman's antecedents, but the author confesses that unfortunately the patient was not sufficiently questioned on this point.

Moreover, as he says, the hæmorrhages, which had continued throughout many years, might have hidden an abortion even from the patient herself.

In studying Gottschalk's case, Veit admits that the tumor may exist before pregnancy. But we are obliged to reject this opinion, seeing that in no case were there before pregnancy any symptoms which could be attributed to a neoplasm.

The histological examination shows a structure which speaks in favor of the opinion generally admitted. Finally, nine out of the sixteen women were under thirty years old, and consequently at an age when, as Nové-Josserand judiciously remarks, the spontaneous development of a malignant tumor is altogether exceptional. The influence of an abortion, with retention of

placental fragments or membranes, is relatively easy to understand (seven times in sixteen cases). The greater part of the authors admit that the neoplasm develops from the *débris* of the decidua. Several have noticed that the point of implantation of the tumor corresponded with the insertion of the placenta, but many remain silent on this question. Nevertheless, we do not know to-day why in one case the retention of the decidua gives rise simply to hæmorrhages or at worst to a *deciduoma benignum*,¹ and in another case to a malignant tumor of remarkably rapid evolution.

Sänger's hypothesis of the infectious nature of the neoplasm no longer merits our consideration, as we now know that in the majority of cases the phenomena of infection are to be observed only at an advanced stage.

In three cases (see table) we see hydatiform moles which mark the beginning of the disease. In two others there was a mole in the recent antecedents. Gottschalk rightfully insists on this interesting coincidence. In fact, five out of sixteen cases is a very important proportion, and it is well known that the hydatiform mole is rare. Other authors, Kaltenbach, Rummel, etc., have already noticed a near relationship between the moles and malignant tumors of the uterus.

Pathological Anatomy.—In studying and comparing the histological examinations that have been published up to this date, we find a constant and characteristic element; an immense cell corresponding to the giant-cells of the decidua. These cells are polymorphous, rounded, elongated, or fusiform, sometimes so piled up against each other that they have become polygonal, at other times sending out prolongations. They usually possess one large nucleus; nevertheless they often have two, rarely more than two. Their protoplasm is homogeneous and granular. There are cells in fatty degeneracy or invaded by necrosis.

In the neoplastic tissue may be seen places where the cells are thrown together in great number, others where they are more or less isolated and mixed up with other elements, such as white corpuscles, cells of connective tissue, and numerous smaller cells.

¹ Goret, Thèse de Paris, 1894.

They are found in the interstices of connective tissue, and in the interior of muscular fasciculi. In other places the giant-cells may be found surrounded by a cellular and finely granular substance. It is sometimes easy to confound decidual tissue with that of a carcinoma (Chiari) or with that of an epithelioma.

There exist small hæmorrhages, resulting from the ulceration of vascular walls. In fact the walls of capillaries are often found invaded by the neoplasm as well as those of veins and arteries, and that, moreover, at a great distance from the primitive tumor. Thus pathological anatomy confirms the malignity of the tumor, that which was already demonstrated clinically. The whole wall of the uterus is usually invaded, and it is not rare to find certain places where the uterine muscle is completely destroyed. In several cases we find the vagina involved as well as the appendages. In every instance that the nodules are accessibly situated there is to be seen a most extraordinary rapidity of development. Metastases in great numbers are formed in the lungs and the pleura, without causing, however, any extensive adhesions. Metastatic nodules are to be found, but not constantly, in most of the other organs,—liver, kidneys, spleen, intestines, and the stomach. In several cases the bones (ribs and femur) have been invaded by the metastases, and more than once the symptoms showed that the brain was not exempt from them. The bladder and the rectum showed nothing abnormal in cases published up to this time. It is almost needless to add that the histological examination always found the metastases to be of the same nature as the primary tumor of the uterus.

Symptoms.—At the beginning the disease passes unperceived. The first sign which attracts the attention of the patient and obliges her to consult a physician is a metrorrhagia, which makes its appearance shortly after an abortion or a normal confinement; sometimes after the expulsion of a mole. In Pfeifer's case, the hæmorrhage began at the end of a menstrual period.

In the case published by Paviot, the hæmorrhages had run through a great number of years, and it was thought that a tumor of slow development had suddenly become malignant, but the autopsy showed that in the uterus there were two distinct tumors,

—one of slow growth and long standing, another very malignant. This second one was a deciduoma malignum.

This hæmorrhage is at first scanty, but little by little, and in a short time, it becomes abundant enough to cause anxiety. A curettage is followed by no lasting effect, and sometimes fails to check the metrorrhagia at all. The profuseness of the hæmorrhage is most intermittent; during several days or even longer it can entirely disappear, or there persists a scanty rose-colored flow; then suddenly makes its appearance a formidable hæmorrhage. Probably these successive hæmorrhages coincide with the progressive ulceration of vascular walls. However, this character of intermittence is not always so marked as we have just described it, and the hæmorrhage itself can be wanting. But this almost constitutes a separate form of deciduoma, of which we will speak further on. These hæmorrhages are obstinate to all treatment, and rapidly bring the patient into an advanced state of emaciation. There is a loss of strength, anorexia, often-times nausea and vomiting. The patient becomes cachectic; she not rarely has syncope. One of Chiari's patients and Hartmann's patient died of hæmorrhage. At a certain time an offensive flux is added to the hæmorrhage or even takes the place of it. This resembles the putrid discharge common in other uterine tumors, and is usually accompanied by a considerable rise of temperature.

It is frequent to meet with a cough and to find pus in the sputa. These latter signs, coinciding, as they always do, with an emaciated state and fever, have led several to believe that the real trouble was pulmonary consumption. However, there were never any physical signs to confirm this diagnosis. The presence of pain is frequent but not constant; its intensity is also variable. Seated generally in the lower part of the abdomen, it is very acute in some cases and is almost completely missing in others.

The vaginal examination often shows that the cervix is softened and the os permeable; but, on the other hand, it is not at all rare to find the cervix quite normal. As to the appendages, the examination ordinarily discovers nothing worthy of mention. The uterus is always increased in size, and sometimes reaches the dimensions of a uterus of three, four, or even five months.

After dilating the cervix the uterine cavity is found to be more or less filled with soft pulpy masses, bearing a strong resemblance to placental tissue, and mingled with clots of blood.

If, after a curettage, a digital exploration of the cavity be made, a spot is found where the wall is softened and where the finger sinks easily into the uterine muscle. This spot is usually situated near the fundus and on the insertion of the masses which were removed by the curettage. In some cases there exists at this point a veritable loss of substance.

Veit and Schmorl have shown that this last sign can be met with in cases of destructive placental polypus.

When the entire literature presents some sixteen cases only of deciduoma, it would be worse than useless to divide them into different forms and varieties. On the other hand, it is to be noted and remembered that in one case the most important symptom—the hæmorrhage—has been wanting throughout the whole duration of the disease. Thus I quote a part of Sängers case, not with the desire of establishing a variety, but rather to insist upon a point which, in that instance, threw the greatest difficulties in the way of a diagnosis.

Sängers case.¹—Woman of twenty-three years. Four months after her marriage she had an abortion of eight weeks, caused by a slip in getting out of a railway carriage. The elimination of the egg was incomplete, and was followed by copious hæmorrhages which lasted three weeks. During the fourth week the rest of the egg was eliminated. This was accompanied with an offensive discharge and septic fever. The curettage of the uterus, which was performed after dilating with laminaria, proved difficult on account of the length of the cervix. The fever disappeared immediately after this operation, but the pulse never ran below 100. The offensive discharge and the hæmorrhages ceased, but there passed five weeks before the patient could leave her bed. . . . It was noticed that the uterus was increasing in size, which was at first considered to be a subinvolution, and later on the organ seemed to form one mass with the exudation. The abdomen remains all this time supple and sensitive. No discharge of

¹ Reported to the Society of Gynæcology, at Leipsic, July, 1888. *Centralblatt für Gynäkologie*, 1889, Vol. XIII, p. 132.

pus. Shortly after, fever and pain in the left hypochondrium. The patient took to her bed again. All at once was formed in the right iliac fossa a soft, painless, elastic tumor, a little larger than a goose's egg. This tumor was considered as an abscess, and there was a presumption that there was a pus pouch in the uterus and that the disease was a chronic form of a septic affection.

The woman was admitted to the clinic, and an incision was made. There was no pus, but the tumor seemed formed by a fungous tissue, of which the size of a hand was removed with the finger and the curette. In the depth of the cavity thus formed could be seen the bone laid bare.

Under the microscope, the *débris* removed were found to be composed of round cells with a large nucleus, mingled with bundles of fusiform cells and numerous small hæmorrhages. No bacilli of tuberculosis. Nevertheless, it was almost admitted that it was a case of tuberculous periostitis of the iliac bone, perhaps connected with an analogous disease of the internal sexual organs. This presumption was still more strengthened by the fact that the patient had a hectic appearance, that she had coughed for some time past, and that there was dyspnœa. But the lungs showed no physical signs. At this juncture the patient was passed into the surgical section. Dr. Thiersch was in favor of the first opinion,—that is, that the disease ought to be traced back to a septic puerperal infection. During these later days the uterus had greatly increased in size, reaching the volume of a three or four months' uterus. The weakness of the patient prevented any operation. She died, emaciated, wasted to the utmost degree, about seven months after the beginning of her illness. In her last days her oppression reached orthopnœa.

Autopsy.—Uterus united on the left side only to the omentum and the intestine by old adhesions that were not very numerous. Through this organ were scattered spongy nodules of a dark-red color, their size varying between that of a nut to that of a large apple. These nodules should be considered as telangiectatic sarcoma. They were soft, easily crushed, and resembled for the most part the fungoid mycosis of the skin. *The uterine mucosa was everywhere smooth; nowhere was it perforated by nodules.* Numerous metastases were found in the iliac fossæ, the two lungs, the diaphragm, and the ribs. The left lung, which contained a mushroom-like nodule, was greatly compressed by a hæmothorax.

The microscopical examination by Dr. Karg showed the giant-

cells, characteristic of the decidua. Säger tends to the belief that the tumor was the first in date and that the abortion was produced by an accidental cause. It is seen that from the time the curettage was performed, up to the end, there were no hæmorrhages. Those that existed before the curettage must have been caused by the retention of placental *débris*, and that for two reasons: firstly, because the hæmorrhage ceased after the curettage and never returned; secondly, because at the autopsy the tumor was found developed in the uterine wall, and, in spite of the numerous metastases, the uterine mucosa was intact without any ulceration.

Diagnosis.—At the first, the diagnosis may be very difficult. Uterine hæmorrhages following normal childbirth or abortion lead one naturally to think of retention of placental tissues. But if the metrorrhagia presents the characteristic intermittence, and especially if there has been a mole in the antecedents, it becomes necessary to discuss the possibility of the existence of a deciduoma malignum. Jeannel makes the following distinction between the hæmorrhages of the deciduoma malignum and those of the fibroma: the hæmorrhages caused by a fibroma are always influenced by the menstrual flow, whereas those of the deciduoma are incessant and independent of the menstruation.

If a curettage has already been performed on the presumption that there was a retention of placental *débris*, and if the hæmorrhages persist with their special character, it is prudent to perform a second curettage and have a microscopical examination made of the fragments removed. This second curettage has but one purpose,—that of determining the true nature of the disease,—and therefore need not be as thoroughly done as in ordinary circumstances. Moreover, it must be remembered that such an operation would be a positive danger the moment that it is really a case of deciduoma malignum, as the curette might easily perforate one of the softened portions of the uterine wall, and in some of the cases where a loss of substance has been signalled it is quite as reasonable to invoke the use of this instrument as a pathological process. However, the possible risk of perforating the uterine wall becomes extremely small when care is taken,

and should never cause any hesitation. This is, indeed, the most important step in the examination of the patient, and may itself decide the whole question.

In several cases the pulmonary phenomena have been so acute as to simulate tuberculosis, and invariably this diagnosis seemed confirmed by a rapid emaciation. A vigorous search will, nevertheless, show a complete absence of physical signs and of Koch's bacillus.

No doubt this neoplasm has often been confounded with other varieties of uterine tumors. Paviot says that probably there are many cases of deciduoma malignum among the cancers of young women. Nové-Josserand thinks that even under the microscope it may have been confounded with sarcomas, epitheliomas, and carcinomas, when the inspection has not been attentive.

In the local examination, it is well to practise the digital exploration of the uterine cavity; for after the removal of the neoplastic masses which filled that cavity, the finger may find a spot where the uterine wall is softened. Several authors have insisted on the importance of this sign.

Termination.—The prognosis of this tumor is particularly gloomy. The evolution is extremely rapid, and if the surgeon does not interfere, general invasion by metastases is certain. The patient may even die of hæmorrhages before the complete evolution of the neoplasm, as in Chiari's and Hartmann's cases. Death has come in a few months' time in every case where there was no radical operation. If the extirpation of the diseased organs does not take place very early, metastases may be already formed, and in this case continue in spite of the operation.

Out of the five patients who have undergone vaginal hysterectomy for this affection, three died shortly after with numerous metastases. As for the two others, there has not yet elapsed sufficient time to show us anything other than immediate results. These are good.

Treatment.—The only operation which can give any hope of saving the patient is total hysterectomy, with removal of appendages. This operation usually offers certain difficulty; the

pulpy tissue of the neoplasm invading the whole uterus and being very friable, it is sometimes very hard to get a solid hold with the forceps. Jeannel advises taking out the uterus without *morcellement*, or, when that is impossible on account of its size, then to take every precaution possible to avoid inoculation. If, on the other hand, it is too late to act energetically, if it be seen that there are already metastases in the abdomen, or if the symptoms lead to the conviction that there are nodules in any of the thoracic or abdominal organs, then treat as any malignant uterine tumor that has passed the period when an operation would have been possible.

CONCLUSIONS.

(1) The deciduoma malignum is a distinct variety of malignant tumor, having histological elements and a clinical evolution that are absolutely characteristic.

(2) This neoplasm has well-established etiological relations with pregnancy, and often with hydatiform moles.

(3) On account of the rapidity of its evolution it is of the greatest importance to make an early diagnosis.

(4) When once recognized, and if there seem to be no metastases, act immediately, operate radically.

(5) The only rational operation is the total extirpation of the uterus with its appendages.

TABLE OF PUBLISHED CASES OF DECIDUOMA MALIGNUM.

Name of Author.	Date of Publication.	Age of Patient.	Pregnancy.	Moles among Antecedents.	The Beginning of the Decidua Coinciding with a Mole.	The Beginning of the Decidua Coinciding with a Normal Confinement.	The Beginning of the Decidua Coinciding with an Abortion.	The Beginning of the Decidua Coinciding with a Vaginal Hysterectomy.	Results: Remarks.
Maier . . .	1876	40	Multipara.	. . .	. . .	. . .	Yes.	. . .	Death a few months after the abortion.
Chiari . . .	1877	23	Multipara.	. . .	. . .	Yes.	. . .	. . .	Death six months after confinement.
Chiari . . .	1877	24	Primipara.	. . .	. . .	Yes.	. . .	. . .	Death six months after.
Chiari . . .	1877	42	Six abortions.	. . .	. . .	. . .	Yes.	. . .	Death a few months after abortion.
Sänger . . .	1888-1889	23	Primipara.	. . .	. . .	. . .	Yes.	. . .	Death in seven months' time.
Pfeifer . . .	1890	36	Multipara.	9 months before.	. . .	. . .	. . .	. . .	Death after five months.
Müller . . .	1891	30	Multipara.	. . .	. . .	. . .	. . .	. . .	Death four months after expulsion of mole.
Gottschalk . . .	1893	42	2 normal childbirths; 3 abortions.	. . .	. . .	. . .	Probably.	. . .	Death several months after operation.
Löhlein . . .	1893	47	Multipara.	One year before.	. . .	. . .	. . .	Yes.	Death one year after operation.
Kötnitz . . .	1893	25	Multipara.	. . .	. . .	Yes.	. . .	. . .	Death two months and a half after confinement.
Nové-Jossierand	1894	24	Multipara.	. . .	. . .	. . .	Yes.	. . .	Recovery.
Pavio . . .	1894	48	(?)	. . .	. . .	. . .	(?)	. . .	Death. Hamorrhages during thirteen years' existence of two distinct tumors.
Klein . . .	1894	27	Multipara.	. . .	Yes.	. . .	. . .	. . .	Death eight months after the mole.
Menge . . .	1894	32	Multipara.	. . .	Yes.	. . .	. . .	. . .	Death six months after the operation, and thirteen months after the expulsion of the mole.
Jeannel . . .	1894	26	One abortion.	. . .	. . .	. . .	Yes.	Yes.	Recovery.
Hartmann . . .	1894	25	One normal pregnancy.	Yes.	. . .	Death a little over four months after abortion.

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TWO CASES OF GASTROSTOMY FOR CICATRICIAL STENOSIS OF THE ŒSOPHAGUS.

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TWO cases of cicatricial stenosis of the Œsophagus, due to the ingestion of concentrated lye, have come under my care within the past eighteen months, in both of which gastrostomy was performed in order to avert impending starvation.

CASE I.—B. M., colored, aged three years, was admitted to the Maryland University Hospital on September 8, 1893. One month previously he drank some concentrated lye, which caused great inflammation and ulceration of the pharynx and Œsophagus, followed by cicatricial contraction of the Œsophagus. Marked laryngitis was also set up, as was shown by barking cough and hoarse voice, as well as by a laryngoscopic examination. Upon admission deglutition was difficult, and was limited to the swallowing of very small quantities of liquids. Numerous attempts were made to pass bougies through the stricture while the patient was under the influence of chloroform, but with very poor success. He became extremely emaciated, his temperature was reduced to 95° F., and upon one occasion fell to 90° F., and his pulse became rapid, irregular, and thread-like. As he was starving from inability to swallow sufficient nourishment, I determined to perform gastrostomy and feed him through the gastric fistula. Owing to his extreme prostration it was feared that he would die under the anæsthetic, but thanks to the skilful administration of chloroform by Dr. Spruill, he bore the operation very well. The operation was performed on November 27, 1893, according to Frank's method. In this operation an incision two and a half inches in length is first made, parallel to the left costal arch and a short distance from it (Fenger's incision), passing through the whole thickness of

the abdominal wall. The stomach is now seized with toothed forceps and a cone-shaped portion of its anterior wall raised and brought out through the incision, and the base of the cone sutured to the peritoneal margin of the wound, thus shutting off the peritoneal cavity. A second incision is made through the skin above the costal arch parallel with and about an inch from the first, and the intervening bridge of skin undermined. The cone-shaped portion of the stomach is now drawn under this bridge of skin and its apex attached to the margins of the wound over the ribs. The deep portions of the first wound are now sutured up to the stomach, and the skin is brought entirely over the stomach and sutured. Forty-eight hours later the apex of the cone was incised and its edges united to the skin by a number of sutures. He was at once fed through the fistula by means of a tube and funnel, and continued to take his nourishment by this channel for the remainder of his life, which was more than a year. The object of Frank's method of performing gastrostomy is to establish an oblique canal, which will act like a valve and prevent leakage. This aim was admirably accomplished in this case, as there was no escape of the gastric contents even when the viscus was distended and the patient made to cough violently. The mucous membrane of the stomach came up to the skin nicely, looking like a little mouth, and there was no excoriation or irritation of the integuments, which is so common when the gastric juice flows over the skin. The boy was fed with milk, raw eggs, cod-liver oil, and whiskey through the fistula, and was allowed to have milk by the mouth; but it was evident that he swallowed but little of it. He could have lived only a few days if gastrostomy had not been done, but he improved rapidly after its performance, and was soon up and around and gained strength and flesh. He passed from under my care on January 1, 1894, and I did not again take charge of him until July. He had improved enormously, except in regard to deglutition, and while he insisted upon having milk to drink and appeared to swallow it, in a short time he would spit it out. The fistula had served its purpose so well that I was disinclined to make further efforts to dilate the cesophageal stricture, which was situated about opposite the cricoid cartilage, and had proven entirely impervious from above; but I realized that he would not receive any proper care when he returned to his home, and so determined to attempt to pass bougies from below. I dilated the fistulous opening and made several efforts to pass bougies through the cardiac orifice of the stomach, but found that it also was strictured to

such an extent as to prevent the passage of any instrument, though it was not difficult to engage the sound in the orifice. Finding that I could neither pass an instrument from the mouth nor the stomach, I performed an external œsophagotomy on the left side on November 19, 1894. No difficulty was experienced in exposing the œsophagus by an incision along the anterior margin of the left sterno-cleido-mastoid muscle, but as the omohyoid muscle crossed the line of incision and was in the way, it was divided. The œsophagus was opened and a small gum bougie introduced and passed through the stricture and brought out at the fistula. To the end of this I tied a silk cord and drew it backward so that one end protruded from the wound in the neck and the other from the fistulous opening. By means of this thread I sawed the stricture, as recommended by Abbe, and was able to pass larger sounds. Some days later I succeeded in passing an Otis dilating urethrotome, and forcibly stretched the œsophagus, after which large œsophageal bougies could be passed from the opening in the neck into the stomach. The upper part of the gullet was still closed, and nothing could be made to pass. There was no opening from the pharynx into the œsophagus. I made an opening by passing steel sounds from the wound in the neck, and was then able to pass bougies from the mouth to the stomach. The œsophagotomy wound healed rapidly, but the frequent passage of sounds and the many and severe operative procedures exhausted his strength, and he died about one month after the performance of the external œsophagotomy, when success seemed almost assured. Could he have lived a little while longer, it is probable that a cure would have been effected. He survived the gastrostomy over a year, and was nourished during that time entirely by the artificial route.

CASE II.—J. W. W., colored, aged one year and nine months, was brought to University Hospital on July 11, 1894. He had been healthy until six weeks before admission, when he swallowed some concentrated lye, the exact quantity not being known. He was able to swallow a little milk until eight days before coming to the hospital, when fluids returned through his nose and deglutition became impossible. He was a wretched-looking child, emaciated almost to a skeleton, and constantly uttering a plaintive cry. On July 13 I performed gastrostomy in the same manner as in Case I. As he had had no nourishment for ten days, his stomach was opened at once and milk introduced. This was a mistake, as some of the milk got on the wound and infection followed, with the formation of a superficial

abscess. His temperature ran up to 104° F. as the result of this abscess, and fell at once on the removal of a few stitches and the evacuation of some pus. The wound closed satisfactorily, and the boy was nourished for four months through the fistula. This patient was extremely fretful, and in consequence of his crying some eversion of the mucous membrane of the stomach occurred; nevertheless the fistula was well adapted to the purpose for which it was intended, though it did not retain the contents of the stomach quite as well as in the first case. He was fed with milk every two or three hours, eggs, cod-liver oil, soups, and whiskey, and soon improved greatly in appearance and strength. As was the case with the other boy, he also wanted something to put in his mouth, and was not satisfied with gastric feeding. In November I was able to pass a small bougie from the mouth into the stomach, and to cause it to protrude through the fistula. To this I tied a stout silk ligature and withdrew the instrument, leaving the cord protruding from the mouth and stomach. I sawed the stricture with this, and was at once able to pass larger bougies, until finally a No. 21 blunt-pointed œsophageal sound could be passed. No bad result followed this manipulation, and a few days later I again passed a No. 16 bougie, but on attempting to pass a No. 18, it passed down through the cardiac orifice of the stomach, but was felt to be behind the mucous membrane. The instrument was withdrawn, and beyond a transient rise of temperature to 102° F. on the next day, no ill effects were experienced. A week later bougies were passed up to No. 22, and the fistula was denuded and sutured, and in a short time it had healed. From this time he has taken all his food *per vias naturales*, and has grown fat, strong, and happy. Sounds have been passed occasionally, and he was sent home in the latter part of January with instructions to have the sound passed at least every two weeks.

Comment on these cases is superfluous. They were both starving from inability to swallow nutriment, and were rescued from impending death by the performance of gastrostomy.

ON THE RADICAL CURE OF INGUINAL AND FEMORAL HERNIA BY OPERATION.¹

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A CAREFUL study of the anatomy and pathology of the abdominal wall in hernia, and an inquiry into the various master operations, bring me to the conclusion that not one operation yet recommended fulfils all the indications requisite for a radical cure. In this decision I have been supported by a study of the relapses and by my own experience. It is surprising what little attention, in works on hernia, is paid to the pathology of the abdominal wall. It is the dike that must be walled up and cemented to prevent leakage. Let the passive intra-abdominal pressure predisposing to rupture be what it may—elongated mesentery, large omentum, or what not—we cannot hope to lessen it to any great extent; but we can strengthen the abdominal wall at the seat of rupture in such a manner as not only to withstand the passive, but also in the vast majority of cases resist the active pressure within the abdomen while straining, lifting, etc. In aiming at a radical cure it is most important to obtain more strength at the seat of rupture than Nature had provided in these cases. If we simply restore the normal rotundity of the peritoneum, the internal ring and canal, as they were in them before the rupture, it is clear that under the same conditions, and with similar causes at work, a recurrence would be almost sure to follow.

Let us briefly consider the anatomical and pathological weak

¹ Read before the Wayne County (Mich.) Medical Society, December 17, 1894.

points in the abdominal wall in ruptured cases of the oblique inguinal variety.

(1) The dimpling at the internal ring. This is the congenital depression in the transversalis fascia at the origin of the spermatic cord, where the vas deferens and the vessels meet. The mere passage of such a vascular cord would lessen the resisting power of the fascia, but when the structures which form it come from different directions, an additional condition, a V-shaped space exists, which predisposes to the occurrence of a rupture. The peritoneum lining it has very little to do with the strength of the belly wall. It is the transversalis fascia that is the all-powerful structure. Its resisting quality is beautifully demonstrated when one is cutting the abdominal wall, while doing an operation or a post-mortem, especially when the intra-abdominal pressure is great, due to the presence of growths or the accumulation of gas, for just as soon as the transversalis fascia is severed out bulges the peritoneum. The internal abdominal ring is formed by this strong fascia, and once the internal pressure overcomes its resistance here, and left without artificial support being supplied, a complete rupture is sure to occur. The hernial protrusion acts like a wedge from within outward, and forces the structures surrounding the deep ring and inguinal canal asunder.

(2) The transversalis fascia is, in old-standing cases, eventually pushed downward, inward, and backward, until the lower border of the ring, not infrequently, reaches the level of the pubic bone. The small normal infundibuliform process has become a large funnel-shaped cavity, so graphically described by Sir Astley Cooper years ago. The importance, therefore, of restoring the deep ring to as small a size as possible without damaging the cord, and of obliterating the pathological funnel-shaped depression, is evident. Macewen was the first to recognize that these two conditions—(a) the anatomical infundibuliform process; (b) the acquired funnel-shaped depression—must be counteracted in order to prevent frequent relapses, after operation for the cure of hernia, and this he aimed at doing by making use of the sac as a plug, at the peritoneal aspect of the internal abdominal ring.

My experience with Macewen's operation, in all those cases where there was a good-sized sac, and not too large an internal ring, nor an hypertrophied cord present, was all that could be desired. It is valuable to retain the sac, but when it is insignificantly small, and the transversalis fascia (at the deep ring) exceedingly relaxed and low down, it is not sufficient to fill the whole concavity at the seat of rupture. Let me say, however, that a small sac folded upon itself is better than no sac at all, and in support of using it as a tampon let me here repeat what I have so often said before, that it is not much more liable to become absorbed than a severed tendo Achillis, because, somewhat like it, its structure is comparatively a passive one, and of fully-matured white fibrous tissue. It has been my fortune to examine an anatomical preparation in the possession of Professor Macewen, from a patient cured by his operation, who without wearing a truss had done heavy work for years, and then died of an aortic aneurism. The specimen showed the inguinal canal firmly closed, and at the abdominal aspect of the internal ring lay the sac folded upon itself into a dense cushion, which absolutely prevented any chance of a return of the hernia. Macewen told me that the rupture was one of long standing, and the sac very large and composed principally of mature fibrous tissue. Should the rupture be recent, and the sac composed of the elastic delicate peritoneum, then I can readily understand the correctness of Bassini's observation that, at an autopsy ninety-five days after an operation, somewhat like Macewen's, not a trace of the tampon could be differentiated. I fancy, however, that the peritoneum must have been somewhat thickened at that situation, although the reparative plastic material had obscured it. That the tampon "must of necessity leave a hard painful swelling slow to disappear," as stated by Marcy, of Boston, has not been my observation, in a single instance, of a large number of cases.

(3) The third condition—a pathological one—necessary to counteract is the overstretched transversalis fascia behind the spermatic cord, which is easily demonstrated by raising the cord from its bed. Bassini, Halsted, Marcy, and others have recognized the importance of restoring the tensivity of this strong fascia, and

forming a new deep ring by suturing it from below upward. Whereas Marcy does not, like Halsted and some others, cut through it, I prefer to follow somewhat in his footsteps, as being safer and more secure, particularly with my inversion stitches.

(4) The spermatic cord is sometimes increased in bulk by supernumerary and dilated veins. To Halsted is due the credit of counteracting this pathological condition, by removing all but one or two of the enlarged veins before making a new deep ring. A large cord, carrying a considerable volume of blood, must have been a frequent predisposing cause of relapses. The larger the cord, the greater the diameter of the ring must be; and the compressibility of its veins would readily allow the omentum or bowel to enter the ring during the maximum of intra-abdominal pressure.

(5) The condition assumed by the muscular aponeuroses deserves careful attention. Some of the changes consequent to the constant pressure for years upon the structures external to the inguinal canal and hernia are, that they first of all assume a tumor-like appearance, which may come and go as the hernial contents protrude or recede. Within a variable time the bulging becomes permanent; and should these parts be now examined the muscular and fibrous portions are found to be thin and overstretched; the muscular tissue more or less fibrous and atrophied; the fibrous elements less resisting; the cremasteric muscle appears like fibrous bands; the external oblique, internal oblique, and transversalis muscles adherent together, making it difficult and sometimes impossible to differentiate one from the other or, indeed, from the sac beneath them with which they also form a strong union; the conjoined tendon is forced inward and backward, while Poupart's ligament is pushed down and outward, and the pillars are found wide apart.

It is interesting to notice the alteration in the surrounding blood-vessels: the deep epigastric artery may be almost obliterated, while the accompanying veins and the superficial vessels are enlarged and more numerous than is normal.

All of the above-mentioned changes cannot be rectified by

any operative procedure; but the abdominal aponeurotic wall can be thickened by overlapping and firmly securing them beneath the cord, while the conjoined tendon and internal pillar, on the one hand, and Poupart's ligament and the external pillar, on the other, can be approximated. While these different conditions and alterations are fresh in our minds, let us briefly associate with them the shortcomings of the principal operations that have hitherto found most favor with the profession in endeavoring to effect a radical cure.

I. Czerny's operation or Bank's, as it is called in Great Britain, consists in removing the sac below a ligature, and of suturing the pillars together.

Objections.—(1) The sac is removed.

(2) The infundibuliform process is not obliterated.

(3) The tensity of the transversalis fascia is not restored.

(4) The enlarged internal ring is not materially lessened.

(5) An enlarged spermatic cord is not reduced in size.

(6) The abdominal aponeurosis cannot be as firmly secured in front of the cord without danger as behind it.

(7) Relapses are too frequent.

II. Macewen's operation in selected and, perhaps, in the majority of cases is probably the best herniotomy for radical cure yet produced. In it the sac is utilized as a tampon to obliterate the infundibuliform process, and the canal is closed by bringing the external structures over the conjoined tendon and overlapping it, thus restoring its valve-like form. This is accomplished by means of one mattress suture of extra stout chromic catgut. I cannot understand how surgeons can consider it a complicated operation, and I am sure it is not extremely difficult to perform.

Objections.—(1) A new ring may not be formed by the suture closing the canal, and the tensity of the transversalis fascia is not restored.

(2) An hypertrophied spermatic cord is not reduced in size.

(3) The suture closing the canal passes over the spermatic cord, which, if tied too tightly, endangers the vitality of the tes-

ticle, and it cannot be as firmly secured as when the cord is transplanted.

III. McBurney's operation¹ is a reproduction of the idea conceived and carried into practice by M. Theophile Anger, in 1887,² and also by Schede, of Hamburg. The neck of the sac is ligatured as high up as possible, and the sac cut off. The edges of the skin are sewed to the deep fascia, the wound packed with gauze, and allowed to close by granulation-tissue formation.

Objections.—(1) The sac is sacrificed.

(2) Scar-tissue weakens the older it gets. We are well aware of the changes that time works in all cicatricial tissues, rendering them thinner and softer. Lucas Championniere and M. M. Terrier³ are decidedly of the opinion, as are many others, that scars resulting from granulation-tissue are not preferable to those obtained from healing by first intention, with which we agree.

(3) The tensility of the transversalis fascia is not restored.

(4) The pathological internal ring is not lessened in size.

(5) The cord is not reduced when abnormally large.

(6) Relapses are becoming more and more frequent.

IV. Kocher's operation consists in dissecting out the sac, dragging it through a small incision in the aponeurosis of the external oblique, twisting it vigorously upon itself, strongly pulling it down, and laying it over the surface of the external oblique muscle in the direction of the inguinal canal, where it is firmly secured with sutures.

Objections.—(1) See objections 2, 3, 4, 5, and 6 to Czerny's operation, which stand equally good here.

(2) It is not suitable without modification to strangulated, incarcerated, irreducible, or congenital hernia. The class of cases which Kocher selects for his operation is inferred from his own words, as follows: "The structures of the spermatic cord are now separated, in which, by holding them towards the light, the border of a very thin hernial sac can be recognized."⁴

¹ Medical Record, New York, 1889, pp. 35, 312.

² Bulletin Société Chirurgie, 1887, p. 664.

³ Bulletin Société Chirurgie, 1887, p. 680.

⁴ ANNALS OF SURGERY, Vol. XVI, No. 6, p. 524.

(3) The results are not of the most promising, and in this connection let me again quote from the same article, p. 505, as follows: "When we assume that about one-fifth of our patients are subjected to a second operation for recurrence," etc. Twenty per cent. of relapses does not speak very highly for an operation which does not include the most difficult cases, and should be discarded on Kocher's own statistics.

On the same page he says, "The chief thing is that we cure four-fifths of the patients, those who remain radically healed with a minimum loss of time and sacrifice of every sort." (An average of seven and a half days in bed.)

V. Bassini's operation has many admirers in America. It consists in ligaturing and cutting off the sac; raising the cord and suturing the border of the rectus, internal oblique, transversalis, and the transversalis fascia to Poupart's ligament behind the cord. The aponeurosis of the external oblique is sewed in front of the cord.

Objections.—(1) The sac is cut off.

(2) The triangular depression, where the vas deferens and vessels meet to form the spermatic cord, is left unguarded except by the elastic peritoneum.

(3) Supernumerary veins are not removed from the cord, should they exist.

(4) I think it an objection that all the aponeurotic structures are not sewed behind the cord.

VI. Halsted's operation differs so much from Bassini's that it may be called quite a different and an original operation. It is a very complete and carefully studied out laparoherniotomy and has added something new to the means which aid in securing a radical cure,—viz., the removal of the superfluous veins from an hypertrophied cord. The skin incision is made in the usual way, but extends upward quite far. "The aponeurosis of the external oblique muscle, the internal oblique and transversalis muscles, and the transversalis fascia are cut through from the external abdominal ring to a point about two centimetres above and external to the internal abdominal ring. The vas deferens and the blood-vessels of the cord are isolated. All but one or two of the veins of the cord are excised." (Halsted.)

The sac is cut away, the peritoneum sutured, and then two other rows of sutures bring the severed structures together. The cord is left subcutaneous.

Objections.—(1) The sac is not utilized.

(2) The six or eight mattress sutures are inserted in such a manner that, when tied, an eversion is effected which leaves, internally, a certain amount of concavity along the whole line of the incision.

(3) The V-shaped depression where the vas deferens and vessels come together is not strengthened.

(4) There is too much cutting of important structures situated above the internal abdominal ring. It is practically a laparotomy.

In Dr. Halsted's¹ paper it is stated that "the communication between the sac and the abdominal cavity is sometimes large enough to admit one's hand."

The severance of the three abdominal muscles and deep fascia above the internal abdominal ring is not necessary. We know that simple abdominal section in the hands of the best operators is (in a certain proportion of cases) followed by rupture. Every structure cut which strengthened the abdominal wall has to be sewed. The more extensive the cutting the more numerous the stitches must of necessity be. In every stitch there is a danger of its being insecure or septic. It is therefore clear that this operation introduces additional predisposing causes of relapses.

From the trend of the foregoing remarks on and objections to the mentioned operations, the character of the combined operation advocated by myself may have already been anticipated. I will now endeavor to describe it.

Operation.—The incision, three or four inches in length, extends parallel to Poupart's ligament over the inguinal canal to the pubic spine. All the structures in front of the inguinal canal from the internal to the external abdominal rings are rapidly divided, and the blood-vessels secured without staining the tissues. The sac is dissected out, almost invariably opened for inspection,

¹ ANNALS OF SURGERY, 1893, Vol. XVII, p. 542.

and its neck loosened from its deep attachments with the finger (Macewen). It is then several times transfixed in a proximal direction with a stitch that has been firmly secured to the distal end, so that when the proximal end is pulled upon the sac is thrown into folds like a curtain. Finally the needle carrying this thread is pierced through the abdominal wall from within outward along the inserted finger between the peritoneum and the transversalis fascia, and made to emerge subcutaneously at the upper angle of the wound, about an inch above the internal abdominal ring (Macewen : Fig. 1). Let it be borne in mind that the needle does not penetrate into the peritoneal cavity. Before fastening the sac *in situ* it is best to raise the spermatic cord and, if necessary, remove the supernumerary veins (Halsted); and even when this is not necessary, it is well to make a circular incision through the fascia propria of the cord, and invert it at the new internal ring. The suture which folds the sac is now pulled tightly, fastened to the external oblique muscle, and the sac adjusted in its proper position. It will be noticed when the cord is raised that the tampon occupies a position at its origin where the vas deferens and vessels meet, and, if of good size, more than fills the infundibuliform process; but when the sac is ligatured or sewed across and cut off, this process is left empty. The next step is the suturing of the transversalis fascia from close to the pubic bone (when necessary) to the root of the cord (Marcy), with three or four of my inversion sutures. When the deep ring is not much enlarged, and the transversalis fascia but slightly relaxed, a couple of stitches may be all that is required. The last one, completing the formation of the new internal abdominal ring, is the most important, just leaving space enough for the cord, and no more. The inversion suture is inserted by piercing the deep fascia parallel to Poupart's ligament in two places from without inward, and from within outward, with the first bite of the needle. The needle is drawn through it, and the thread is carried across to the border of the conjoined tendon, where a similar bite is taken directly opposite. (Fig. 1.)

When all are passed and tied, they restore the tensiety of the transversalis fascia, at the same time invert the tissues and cause

a convexity on the internal surface. In passing these stitches, great care is exercised not to include the peritoneum. In some cases the fascia and peritoneum may be adhered together. Then it is wise to place the patient in the extreme Trendelenburg posi-

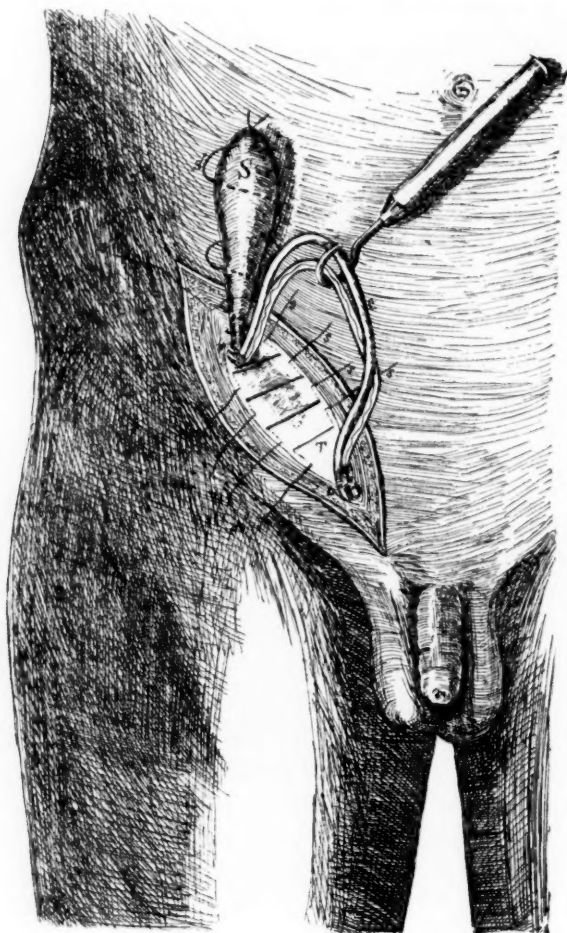


FIG. 1.—S. Sac.

s'. Suture in sac.

C. Cord.

vv. Veins excised.

T. Transversalis fascia, showing deep ring enlarged.

ssss. Sutures in transversalis fascia, restoring the internal abdominal ring.

tion, and always use a fully-curved needle without a cutting edge. It is only necessary to suture that portion of the transversalis

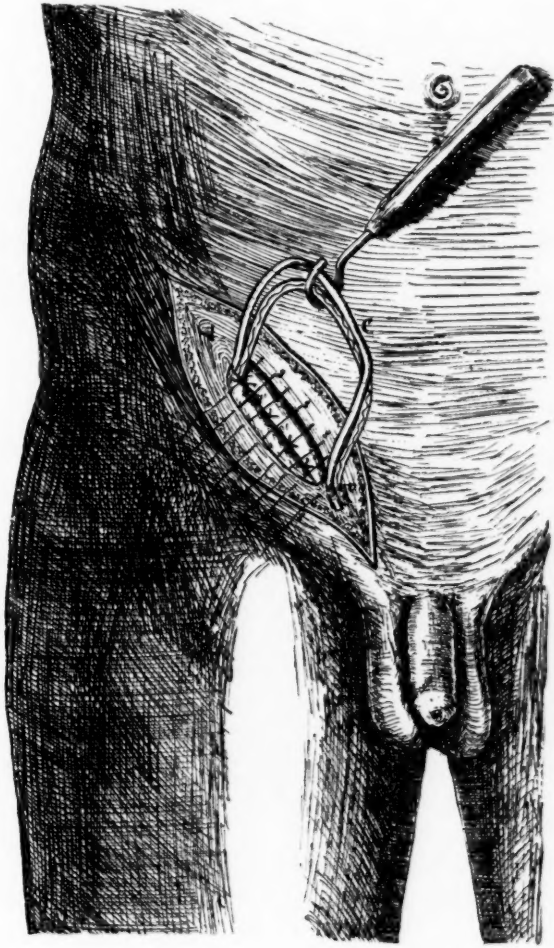


FIG. 2.—C. Cord.

v. Veins excised.

S/S'. Sutures in transversalis fascia tied.

ssss. Sutures closing the canal.

fascia that has become relaxed. The approximation of the muscular aponeuroses of the abdominal wall is done with three or

four mattress sutures from below upward, in such a manner as to bring the external and lower structures—Poupart's ligament, fibres of external oblique, internal oblique, and transversalis muscles—over and in front of the internal and upper structures,—conjoined tendon (Macewen), external oblique, and all beneath the cord (Halsted: Fig. 2).

The first mattress suture is made to penetrate the conjoined tendon and internal pillar in two places with one turn of the needle, from without inward near their lower border, and again from within outward. The two ends of the thread are now passed through Poupart's ligament and the internal pillar from within outward, about half an inch apart. In passing the rest of the sutures, exactly in a similar manner, the practical part to remember is that all the structures from the transversalis fascia to the subcutaneous fat are included, and that they are all tied beneath the cord. When the conjoined tendon is thin and delicate, the border of the sheath of the rectus muscle must be grasped by these sutures. Should the overlapping be considerable, it may be, and often is, necessary to put a few retention sutures along the edge of the overlapping structures. To complete the operation the cord is laid on the external surface of the external oblique muscle, and the skin sutured over it with a continuous buried suture (Halsted), or in the ordinary manner.

I have only operated after this method for about a year and sufficient time has not elapsed to speak of results; but the combination operation (as I call it) should commend itself, in that it is based on anatomical and pathological facts, and upon the results of other operations. It utilizes the sac for a purpose, tightens up the transversalis fascia, and makes a new ring for good reasons; it reduces the size of the spermatic cord when it is redundant; it makes the best use of the aponeuroses to thicken and strengthen the abdominal parietes; and it is suitable to every degree and form of oblique inguinal hernia, from bubonocoele to complete scrotal, even incarcerated or strangulated.

Should the hernia be congenital, the enlarged tunica vaginalis testis is divided into two parts obliquely from below upward to a point where separation of the serous membrane from the cord is

most easily effected, and each half closed by itself,—the one forms a neat tunic for the testicle, and the other half a sac to be used as a tampon. (Fig. 4.) The operation is now proceeded with as already described.

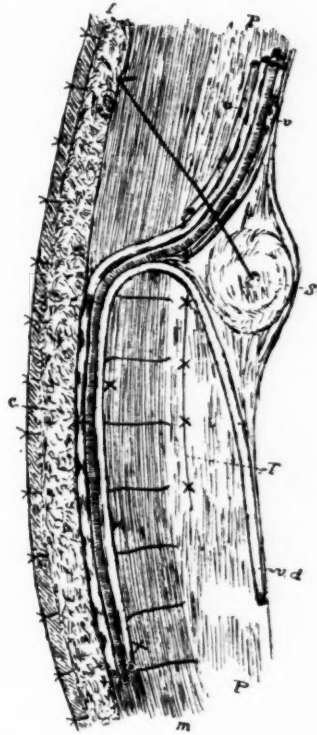


FIG. 3.—C. Cord in its new bed.

m. Muscular wall sutured.

P. Peritoneum.

vv. Veins excised.

v.d. Vas deferens.

I. Integument and subcutaneous tissue.

S. Sac folded upon itself, showing the puckering suture.

T. Transversalis fascia sutured.

Fig. 3 schematically represents a longitudinal section of the completed operation.

THE RADICAL CURE OF FEMORAL HERNIA.

The radical cure of femoral hernia has not engrossed the attention of surgeons to the same extent as have operations for the inguinal variety. This may be partly because the material is not so abundant, and owing to the belief of the operation being more difficult to perform. Even our most recent text-book¹ takes no notice of the radical cure of femoral hernia.

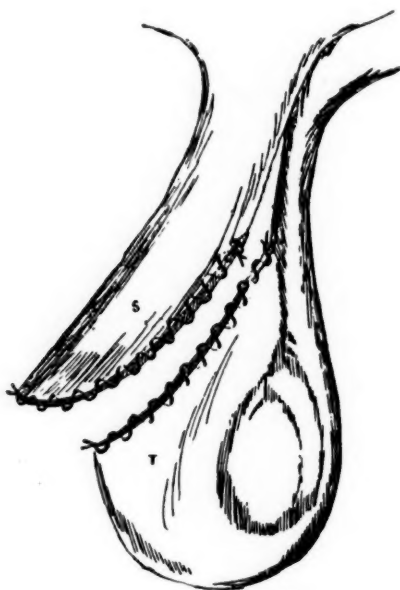


FIG. 4.—The sac in congenital hernia.
S. Sac formed from upper part of tunica vaginalis testis.
T. New tunica vaginalis testis.

The crural rupture is much more liable to become strangulated than is the inguinal. It is not uncommon to find it "strangulated at the time of its first descent," which fact alone calls for more consideration of this affection.

Sir Astley Cooper dissected out the sac and closed the femoral ring by sutures. Mitchell Banks places a ligature round the neck of the sac and then cuts it away, but no attempt is made to

¹ An American Text-Book of Surgery.

close the canal. Ball and Heuston twisted the sac, ligated its neck and cut it away, and closed the femoral canal with sutures. Barker removes the sac after ligating its neck. The stump of the sac is pushed under the femoral arch and the canal closed with sutures which grasp the pubic portion of the fascia lata and

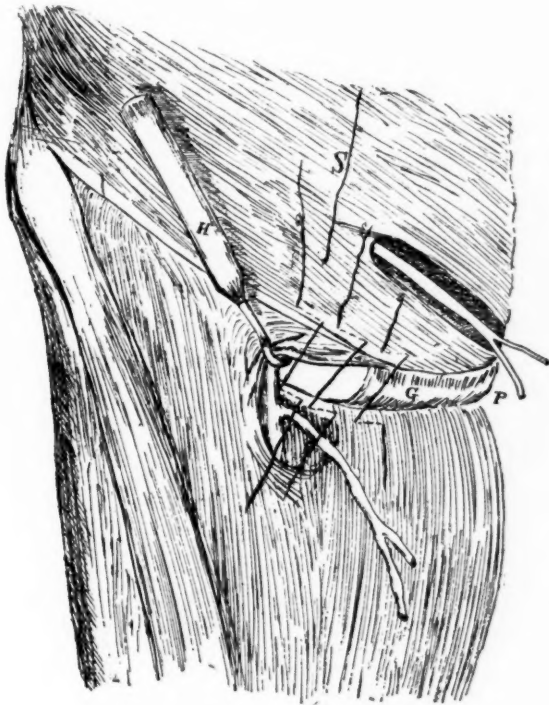


FIG. 5.—H. Blunt hook raising falciform ligament.
 S. Suture holding the puckered sac in situ.
 sss. Sutures inserted into the pectineal fascia and Poupart's ligament.
 P. Pubic bone.
 G. Gimbernat's ligament.

Poupart's ligament. Marcy cuts the sac off below a ligature, and closes the canal by sutures of kangaroo tendon. McBurney used the open method, the sac being ligated, cut away, and the wound packed with iodoform gauze. Macewen, of Glasgow, used his unique method, which has not yet been surpassed, especially with

the slight modifications recommended by Cushing, of Boston, and others who have followed in his footsteps. The sac is saved, folded upon itself with a puckering suture, pushed within the abdomen, and fastened there so as to form a prominence on the internal aspect of the peritoneal cavity, which in the most efficient manner possible plugs the femoral canal from within outward with the most desirable material.

Macewen completed the operation by stitching the falciform process to Gimbernat's ligament, thus restoring the valve-like condition of these parts in their natural relationship.

Dr. Cushing closed the femoral ring with a quilted suture,

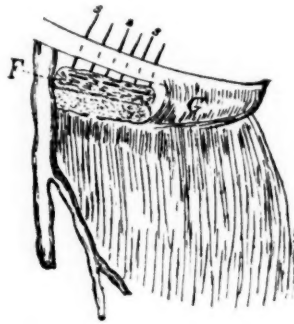


FIG. 6.—G. Gimbernat's ligament.

F. Periosteal flap.

sss. Sutures uniting periosteal flap with Poupart's ligament.

fastening the pubic portion of the fascia lata covering the pectineus muscle to Poupart's ligament before closing the saphenous opening after Macewen's method. This, to my mind, counteracts all the pathological conditions presented in the vast majority of cases of femoral hernia, and a radical cure is effected.

I close the canal with three inversion sutures (Fig. 5), seizing hold of the pubic fascia close to the bone, and then grasping the ligament of Poupart from above downward, which, when tied, recede the falciform process behind them into the canal on a level with the deep crural arch. In this position the external structures are closed upon the boss within. When the sac is

small and slender, and Poupart's ligament cannot be brought down sufficiently close to the pectineal fascia to effectually obliterate the femoral canal, there need be no hesitation in raising a periosteal flap from the pubic bone, sewing it with quilt sutures to the deep crural arch (Fig. 6), and then fastening the falciform process beneath it, as already described. I have raised the periosteal covering only in one case, but it admirably suited it, and a most satisfactory result was obtained.

Dr. W. Watson Cheyne¹ described a new method for operating for femoral hernia. The sac was ligatured and cut off and a flap from the pectineus muscle (taking its whole thickness) was raised and sutured into the femoral canal as an external tampon. It is hard to see the philosophy of cutting off a sac which can be readily, safely, and efficiently utilized as a plug, being already fibrous tissue, and raising a mass of muscular tissue which in time becomes converted into fibrous material. Should the sac be too small and the canal large, no doubt Cheyne's flap would be a great help to prevent relapse.

Dr. Josef Fabricius² recommends to ligate the sac and cut it off; freely expose the crural canal by division of the superficial layer of deep fascia and removal of loose cellular tissue; the internal attachment of Poupart's ligament is divided, thus relaxing it, and it is then stitched to the pectineal fascia, the origin of the pectineal muscle, and to the periosteum of the horizontal ramus of the pubes. The first stitch is applied next to the femoral vessels, which have been held by a blunt hook towards the ileo-pectineal eminence, and this stitch prevents them from returning to their normal position. This author also recommends to stitch the superficial layer of deep fascia to the pectineal fascia along the femoral vein. The objections to this operation are,—(1) the removal of the sac; (2) the division of Poupart's ligament; and (3) the permanent displacement of the vessels, if such is possible, would have a tendency to produce a varicocele of the femoral vein.

Bassini³ has given his method of operating on femoral

¹ *Lancet*, London, 1892, p. 1039.

² *Centralblatt für Chirurgie*, February 10, 1894.

³ *Archiv für klinische Chirurgie*, Band XLVII.

hernia. It consists in removing the sac and then using two rows of sutures, one fastening Poupart's ligament to the pectineal fascia to close the femoral canal, and the other securing the falciform ligament to the pectineal fascia.

Let me recapitulate the steps of the operative procedure I recommend for the radical cure of femoral hernia.

(1) The skin incision is made parallel to Poupart's ligament and half an inch above it. This allows one to reach the neck of the hernia with ease and accuracy; the scar will be out of reach of the pressure or friction of the thigh, and it allows of an examination of the inguinal canal and rings, which is important.

(2) The sac is dissected from the surrounding structures and opened, unless by feeling you are certain that it is empty. As a rule, it is better to open the sac, and, should omentum be found, it is tied with interlocking ligatures and cut away. The raw stump left should be covered with peritoneum before returning it into the abdomen.

(3) The sac is now folded upon itself and fastened within the opening of the crural canal (Macewen). The whole sac is better than the stump of one or no sac at all. It should not be ligatured round its neck and then retained (as is the practice of some surgeons) because its nutrition is directly interfered with, which may cause it to slough off; or, should it live by imbibition from the surrounding structures, as it usually does, degenerative changes are liable to follow.

(4) When the sac is sufficiently large to close the internal opening of the canal, suturing of the pubic fascia to Poupart's ligament, and placing the falciform process into the external opening of the canal by means of the inversion sutures of strong chromic catgut or silk is quite enough.

(5) When the sac is small, the hernial opening large, and Poupart's ligament cannot with ease be approximated to the pectineal fascia, a periosteal flap may be utilized, or a flap of the pectineal fascia and muscle can be raised and stitched to form a buttress instead, as practised by Cheyne. After the above method I have operated but four times.

FIBROSIS OF THYROID, PARTIAL THYROIDECTOMY, TRACHEOTOMY, AND DILATATION OF THE STENOSED TRACHEA.

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FIBROSIS or fibrous degeneration of the thyroid gland following upon a primary enlargement must be a very rare disease. No case of the kind appears to have been put on record. Ziegler alone simply mentions the occurrence of the disease. The clinical course of the case before and after operations, as well as the microscopical appearances of the portion removed, exclude fibrosarcoma such as described by Bowlby.¹

A pale, thin domestic servant was born and has always lived in London. More than seven years ago her parents noticed a soft swelling in the region of the thyroid which, after existing for some time, gradually got smaller and harder. With this decrease in size difficulty in breathing came on.

The mother has had for years a soft thyroid tumor situated at the junction between the isthmus and the right lobe. This is either an adenoma or a flaccid cyst.

When the patient was first seen the thyroid gland appeared to be normal, both in shape and size, but it was of stony hardness. The pulse was 130 or 140 per minute without exophthalmos. Stridor was heard over the whole chest, being loudest in the trachea at the level of the isthmus. Over the apices of the lungs the sounds were not unlike those commonly associated with phthisis. She exhibited, however, no other signs of this disease.

¹ Lancet, 1884, II, 1001.

Whilst under observation the stridor gradually increased, and cyanosis became marked; the pulse never fell below 130.

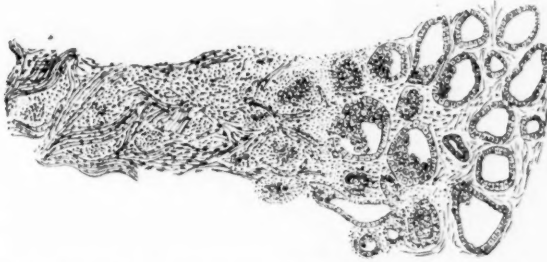
The duration of the affection and the decrease in size of the thyroid from its previous enlarged state led me to make a diagnosis of calcification of a formerly enlarged bronchocele.

On April 11, 1894, under slight chloroform anæsthesia, a median incision was made down to the isthmus. The texture of the isthmus when cut into was that of the hardest fibrous tumor, but there was no calcification. In spite of careful attempts, no line of demarcation could be made out between the isthmus and the trachea; therefore the isthmus and the adjacent part of each lateral lobe were shaved off from the trachea, leaving a portion of the gland on either side about as large as the end point of the thumb. The trachea thus exposed felt like a soft tube and was sucked in and blown out by inspiration and expiration. The cartilaginous rings had softened or disappeared. As the breathing was none the better for the removal of the isthmus, the trachea was opened immediately below the cricoid cartilage. The rings were at this spot normal, but on retracting the sides of the incised trachea the lumen was seen to be narrowed below to a chink. The incision was therefore extended downward through the part of the trachea which had been in contact with the thyroid until cartilaginous rings were again met with. The mucous membrane appeared normal, being merely thrown into folds in the narrow part. A Parker's silver tracheotomy tube was inserted, and the breathing became free. After the patient had worn the tube for a fortnight she was gradually able to discard it, so that at the end of a month from the operation the wound in the neck had entirely closed.

The patient was shown at a meeting of the Laryngological Society of London on December 12,—*i.e.*, ten months after,—in good health, breathing without trouble, a faint stridor only being audible in the trachea. The remainder of the thyroid on either side of the trachea could be felt to be very hard and, perhaps, at this time a little smaller than immediately after the operation. Certainly there had been no increase. The pulse-rate was still 120 per minute.

On examination of the tissue removed, a part showed thyroid alveoli in no way dilated and containing normal colloid matter, but the alveoli were separated from one another by an increased amount of fibrous tissue. In the rest of the material removed all glandular structures had been replaced by dense fibrous tissue, without any sign of sarcomatous elements or of cysts, but showing vessels with well-marked walls.

Between these two parts the thyroid alveoli were smaller in size and filled with epithelial cells, or clumps of epithelial cells surrounded by small cells marked the position of a former alveolus, or, lastly, groups of small round cells alone were visible. The fibrosis seemed to have spread inward from the capsule of the gland.



Section showing minute structure of the degenerated thyroid gland.

After the longitudinal division of the stenosed portion of the trachea the dilatation may be expected to persist to a large extent, if the behavior of other strictured tubes forms any analogy. The unaltered condition of the mucous membrane must importantly favor the maintenance of the dilatation. The rapid pulse would seem to date from the time when an enlarged bronchocele was present. It is remarkable that it should remain rapid when so much of the gland has been put out of action. No myxœdematous symptoms have supervened, for some active thyroid tissue is still left, and the stony hardness of the gland differs widely from the soft and withered gland occurring with myxœdema. The most important surgical feature was the fact that the trachea was intimately included in the disease, whereas the clinical and microscopical appearances are clearly opposed to malignancy.

REPORT OF FOUR CASES OF NEPHRECTOMY FOR PYO- AND PYELO-NEPHRITIS.¹

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PRIOR to 1893 my experience with kidney surgery was limited to perinephritic suppuration, although I now strongly suspect that several of my earlier cases, as well as some diagnosed as old pelvic and abdominal abscesses, originated in the kidney substance itself.

Although the symptoms of pus in the kidney, from whatever cause, may be obscure, even when suppuration is, from the general condition, evidently somewhere going on, systematic physical exploration will leave undetected comparatively few kidneys which ought to be brought to the attention of the operating surgeon.

Even moderate enlargement of the kidney can, in the majority of cases, be determined.

A movable kidney tumor usually presents signs which, added to the history and the examination of the urine, prevent the diagnosis from being difficult.

A dilated gall-bladder has, however, been mistaken for this organ, as have also tumors of the pancreas and spleen.

That a limited patch of malignant disease, on the greater curvature of a dilated stomach, was not a wandering kidney, was in one case revealed to me only by an exploratory laparotomy, and I lately cut down on to a displaced and movable liver, under the impression that it was a tumor connected with the right kidney.

¹ Read before the Worcester Medical Association, February 27, 1895.

Such errors of commission are, however, uncommon, and serious doubt as to the location of tumors is rarely possible.

By ureteral catheterization we can, in the female, determine in which kidney pyelitis is present in many cases, or can settle the equally important point, whether both kidneys are unfortunately seriously affected.

Kidney suppuration diagnosed and all methods failing to determine the affected organ, we are reduced to exploratory incision, either median or, better, to one or other side of the abdomen, as advocated by those who prefer the abdominal route, or in one or the other flank, following the extra-peritoneal operators, taking thus one chance in two of finding the affected kidney, and, failing in the first incision, turning to the other side for the diseased organ.

My cases have all been suppurative; the lumbar route has in all been taken. In three of them the kidney was removed some weeks after a preliminary nephrotomy. In none were calculi found.

CASE I.—*Chronic Pyelo-Nephritis, with Acute Exacerbation; Nephrotomy, followed in Eight Weeks by Nephrectomy; Recovery.*—N. D., aged twenty-five years, married, was sent to the City Hospital January 18, 1893, with a diagnosis of peritonitis. She stated that, six years before, a physician (Dr. Halloran) told her that she had kidney disease. The Memorial Hospital records made no mention of such disease one and a half years later, at which time she was under treatment there for the sequelæ of a miscarriage.

Two years before entrance, having again miscarried, she had severe pain in the left loin and lumbar region similar to that accompanying the present attack, but recovered without medical attendance. A year later she again miscarried.

Eight days before coming to the hospital, there was a severe sudden attack of colicky pain on the left side, accompanied and followed by nausea and vomiting. This was controlled by opiates, and grew gradually less paroxysmal and more constant, extending also further towards the centre of the abdomen. There were chilly sensations, but no decided chill. The urine was muddy with a heavy sediment from the beginning, and may have been so for a long time previous to this attack. For five days there was no movement of the

bowels. When seen the expression was anxious, the skin hot and dry, the temperature 103° F., and the pulse 120. A tender swelling occupied the left loin from costal border to iliac crest. This was flat on percussion, and as large as a child's head at birth. The muddy urine had a most foul odor, contained $\frac{1}{2}$ per cent. of albumen, and the sediment occupied one-third of its bulk on settling. This sediment consisted, as far as could be determined, solely of pus-corpuscles.

There could be but one diagnosis. Dr. R. W. Greene, to whose wards she was admitted, at once recognized the surgical importance of the case, and she was the next day, after consultation, transferred to my service.

January 20, by longitudinal lumbar incision, the kidney was reached and freely incised. Some eight ounces of foul pus escaped. The organ was practically converted into a suppurating cyst, though kidney tissue could be recognized in its wall. No calculi were present, nor was the ureter apparently blocked. After washing out, the cavity was packed with iodoform gauze, with a central drainage-tube. Shock was very severe, the pulse being over 150, and numerous stimulant hypodermic injections were given during and after the operation. Gauze was removed on the third day, and the wound daily and freely irrigated, until in six weeks the patient, who was helping in the ward work, eating and feeling well, was, although with still a small discharging sinus, at her own request allowed to go home.

March 19 she was readmitted, drunk, with a sprained ankle, and a foul discharge from the evidently neglected sinus. There was, at this time, pus in the urine.

Four days later the old incision was reopened, and the kidney dissected out and removed. The vessels and the ureter were at first separately tied with silk, and then, by a third ligature, resecured together. Hæmorrhage slight. Gauze packing as before. Shock was severe, and for five days the outlook was dubious. Nausea and vomiting were almost constant, the abdomen became much distended, no nourishment could be taken, and even enemata were rejected.

Some very dry champagne was at last retained, and the patient gradually rallied.

Convalescence was slow, there was much burrowing of pus, and it was not until June 5 that she finally left the hospital, and then against advice, as a small sinus was still discharging.

Soon thereafter she was confined in a public institution where, for a year at least, she had healthy surroundings.

The wound is now, two years after operation, entirely closed and her general health is perfect.

CASE II.—*Pyelo-Nephritis with Perinephritic Abscess; Nephrectomy Six Months after a Late Nephrotomy; Death; Autopsy.*—W. S., aged thirty-two, married, entered the City Hospital December 15, 1891. Nine days before he noticed a bunch in the left side, having previously, and for some time, had pain in this region. A sharply defined, doubtfully fluctuating tumor extended from the ribs to the iliac crest. This was painful, but not particularly tender, and seemed to be retroperitoneal. The specific gravity of the urine was 1024, and the reaction acid. No albumen was present. The patient received an injury to the left testicle ten years before, followed by suppuration for a long time and at intervals. A soft mass occupied the site of this organ, and there were indurated scars in the left side of the scrotum. The general condition was poor.

December 17 Dr. H. Gage, then on duty, by a lumbar incision evacuated five pints of foul pus, and packed and drained the enormous abscess cavity.

January 11, 1892, when I first saw the patient, the wound was still discharging pus, the left thigh was swollen, oedematous, and tender to pressure, particularly on the inner side, and there was phlebitis of the deep veins of the leg.

February 6 the patient was, and had been for some time, markedly septic; the temperature was ranging from 102° to 104° F. at night, and pus was pouring from a small opening at the site of the December incision. Under ether I at this time made a new lumbar incision, opened a large partially filled abscess cavity, and found at the bottom what was apparently the left kidney hard and swollen. A somewhat restricted incision into this showed no kidney structure, but a tissue fibrous and grating under the knife.

No fluctuation being felt and no communication with the abscess detected, the perinephritic cavity was packed and the operation terminated. (It is clear to me now that my incision was simply into the thickened capsule, not deep enough to reach the seat of trouble.) No improvement followed, and pus soon began to burrow in various directions.

March 12 the sinuses were slit up, and the abscess cavity curetted out under ether.

From April 1 to June 7 the patient was under the care of Dr. O. H. Everett, who succeeded me. No further operations were done, and he was at the latter date discharged unrelieved.

October 3 he was readmitted, weaker, with much pain in side and leg, two sinuses in the back, both discharging freely, and a septic diarrhoea; the urine with a specific gravity of 1022, a trace of albumen, a slight amount of pus, and a few blood-corpuscles, but no casts.

October 15, the diarrhoea being somewhat better, Dr. Gage reopened the abscess cavity, now extending high up under the ribs and far down towards the pelvis, and at the bottom exposed the lower end of the soft and boggy kidney, which he freely opened, giving vent to pus and broken-down tissue.

Improvement was but temporary, the patient continuing septic, with high temperature, diarrhoea, occasional nausea, and persistent and excessive discharge.

December 20 a large abscess, deep down under the muscles of the front of the thigh, was opened.

January 1, 1893, when I again came into the wards, one could irrigate from the openings in the back through that in the front of the thigh; the left thigh was flexed to a right angle; there was pain, diarrhoea, and a copious discharge, soaking everything twice a day. For three months nothing was done except intermittent extension to the leg, and death was apparently soon to terminate the scene. Finally, as he seemed a little stronger, and as he demanded another operation, although told the chances were ten to one against him, I, on March 30, fifteen months after he first came under hospital observation, removed the kidney. The urine now contained $\frac{1}{8}$ per cent. albumen, pus free and in clumps, renal epithelium, and abundant hyaline and fine and coarse granular casts.

The kidney tissue was very friable, and hæmorrhage excessive. It was impossible to thoroughly free the kidney behind, find vessels, make a narrow or, indeed, any proper pedicle, or pass a ligature, and with clamps and tight packing the hæmorrhage was controlled, and the operation hurriedly finished. The patient never rallied, and died in ninety minutes. The operation lasted nearly one hour.

At the autopsy, held that afternoon, it was found that the psoas muscle on the left side was infiltrated with round-cell inflammatory material, which new formation extended up to and surrounded the renal vessels with the thick tough mass, which had prevented the

complete removal of the kidney and the securing of its vessels. The other kidney was, as was suspected, amyloid, and the one removed a mere mass of detritus and abscess wall, with very little kidney tissue to be seen.

CASE III.—*Chronic (?) Pyonephritis with Acute Exacerbation; Nephrotomy, followed in Six Weeks by Nephrectomy; Recovery.*—June 18, 1893, I saw at her home, in consultation with Dr. R. W. Greene, Mrs. L. B., aged twenty-eight years.

Since the birth of a child four years before, her health had been unsatisfactory. Her previous medical attendant, now deceased, had thought her symptoms dependent on a laceration of the cervix uteri, and six weeks before I saw her trachelorrhaphy had been performed by an out-of-town surgeon.

Since this operation she had been confined to her bed, had been steadily growing worse, and was when I saw her markedly septic. Her temperature averaged about 102° F.; she had daily chills and profuse night-sweats. All stitches had been removed from the cervix. Nothing could be detected per vaginam to account for her condition. The urine had been once examined by Dr. Greene, who had been but a short time in attendance, with negative results.

Tenderness and increased resistance were noted in the right lumbar region, but, as the patient was desirous of entering my service at the Memorial Hospital, the diagnosis was left in abeyance until further urinary analysis could be obtained.

The urine was at the hospital found to contain $\frac{1}{8}$ per cent. of albumen and an abundant sediment, consisting principally of pus with a small amount of blood and some bladder epithelium. The reaction was acid. It was now learned that for a long time there had been intermittent pain in the right side running down from the lumbar region into the right hypogastrium, and that coincident with an attack the patient had noticed that the urine was clear, while at other times it was thick and muddy. Clear urine free from pus was also obtained once after she entered the hospital, thus substantiating Dr. Greene's analysis.

In the right lumbar region could be made out a moderately-tender tumor, occupying the site of the kidney, and reaching well down to the iliac crest.

This was manifestly the source of the pus in the urine, and could be nothing but the enlarged or dilated kidney.

Nephrotomy was decided on as a preliminary and possibly final

operation (her condition seemed to render nephrectomy at this time a desperate measure), and June 27 by longitudinal lumbar incision the kidney was reached, and a large quantity of pus evacuated. The walls of several small abscesses with which the kidney was honey-combed were broken down with the finger, and the whole packed with gauze and drained with rubber tubing.

Immediate improvement resulted: the urine became clearer, though it still at times contained pus; the temperature fell; there were no more chills; night-sweats ceased, and the appetite increased. Early in August, however, there was renewed complaint of pain; diarrhœa appeared; there were occasional chilly sensations; the temperature began to rise; and there was more pus in the urine, although drainage was still free.

August 18 the kidney was removed by reopening the old incision. The ureter and vessels were tied separately. Handkerchief gauze packing and poultice to the left kidney. Hæmorrhage insignificant. Time of operation thirty minutes.

Shock was profound and pain severe. The pulse remained at 120-140 for several days, and vomiting persisted until champagne was given, when it at length ceased. Convalescence was prolonged, and a sinus remained for nearly five months, closing only after both silk ligatures had been discharged.

Five days after the operation urine appeared in the dressing, and for several weeks escaped in large quantities. This, of course, regurgitated through the dilated (?) ureter, from which the ligature had evidently slipped. Nine months after the operation a superficial abscess was evacuated, after which the wound rapidly healed, and is now perfectly sound.

At present, eighteen months after operation, the patient is in good health, better, she says, than for many years.

Dr. Lois Nelson, the hospital pathologist, reports that the specimen consists of the right kidney without capsule. Weight three ounces; length four and a half inches; width two inches; thickness one and a quarter inches. Thickness of cortex one-eighth of an inch; of medulla one and one-sixteenth inches. External surface lobulated from contraction of interpyramidal tissue. Raised portions dark red, depressed portions yellowish.

Longitudinal Section.—Cortex varies much in appearance. Some parts are white and opaque; others show plainly medullary rays and labyrinths. No healthy medullary pyramid remains, an abscess hav-

ing developed in each. Some of these pus cavities are lined by thick white membrane. One has a diameter of seven-eighths of an inch; another of one and one-eighth inches. The remaining eight are of various sizes. One opens into pelvis of kidney. The kidney is so friable that the pelvis is badly disintegrated.

CASE IV.—*Acute Pyonephritis with Marked Symptoms; Primary Nephrectomy; Recovery.*—Mrs. H. F., aged twenty-two, a mulatto, was admitted to my service at the Memorial Hospital, April 8, 1894. Since the birth of a child, six months before, she had been in poor health, but beyond general complaints of "misery" little definite could be learned of her symptoms.

She was from February 27 until March 22 at the hospital under the care of another physician.

From the records it appears that at entrance the urine was examined for albumen and sugar and that neither was present. Nothing abnormal was detected in the pelvis. The respiratory murmur was fainter over the right lung than over the left. Treatment was directed to pain in the left ankle, of which alone she complained, and to the arrest of a troublesome leucorrhœa.

There was an irregular nightly rise of temperature to 101° or 102° F., and this existed at the time of her discharge, although she was then up and about. For this temperature no cause was found.

At the time of her return, two weeks later, when I first saw her, the pulse was 115, the temperature 103.6° F. Albumen was present in the urine and numerous pus-corpuscles were found in the sediment.

The patient had for three days been constipated, for a week had suffered from paroxysmal pain in the right inguinal region, and for five days had been continuously vomiting. Nothing was found in the pelvis, but there was increased resistance and tenderness to pressure in the right lumbar region, and a hard, moderately movable body, assumed to be the enlarged kidney, was dubiously apparent.

Vomiting was uncontrollable, the patient's condition was becoming desperate, and an exploratory operation at least seemed indicated.

April 12, after securing free catharsis, the usual straight lumbar incision was made, the tumor reached without difficulty, and found to be the enlarged kidney.

In separating it from the perinephritic fat, the finger penetrated its softened lower end, opening also a small abscess. No large abscess cavity being found, it seemed best to enucleate immediately, and the kidney was accordingly peeled from its capsule and removed.

The ureter was tied and stitched to the lower angle of the wound, and a separate ligature thrown around the vessels. Through incautious traction on the delivered kidney these latter were stretched so taut that they slipped through the ligature when the tension was removed, but were, fortunately, secured by the thumb and finger before much blood was lost. Handkerchief gauze packing and poultice to the remaining kidney. Time of operation thirty-five minutes.

Shock was so marked, in spite of abundant stimulation, that for two hours the patient was left on the table with pelvis and legs elevated. For seventy-two hours vomiting was persistent and everything was rejected. Finally champagne was retained, and from this on convalescence was uneventful. The wound was closed in four weeks and the patient discharged well May 27.

Dr. Nelson reports that the kidney removed was five and a half inches long, two and a half inches wide, and one and a half inches thick, with a weight of eight ounces. The kidney substance was very friable; the entire surface congested. On the surface were fourteen large and numerous small raised areas, the periphery of each being deeply congested and the centre whitish and necrotic. From some of these, when opened, pus exuded. At the lower end was an opening made by the surgeon's fingers. The cortex was from three-eighths to three-fourths of an inch in thickness. The difference between the medullary rays and the pyramids of Ferrein was very marked, the medullary rays looking fairly healthy, while the pyramids of Ferrein were deeply congested and had necrotic areas varying in size. Many of the pyramids of Malpighi were hyperæmic, while others seemed to be normal. The pelvis was congested at the lower and normal at the upper end.

Under the microscope very little kidney tissue was found. Most of the glomeruli had shrunk, the epithelium of Bowman's capsule was granular and swollen, as was the epithelium of the convoluted tubes. Pus was seen in many tubules. There were numerous hæmorrhages, and small abscesses throughout the section. In many places the kidney structure was replaced by small round cells of inflammation and by abscesses. No tubercles were found.

From October to December of the last year Mrs. F. was in the hospital with some obscure septic trouble. She had remained well for five months, when she was suddenly seized with pain in the right side, chills, and fever. There was neither pain nor tenderness at the site of operation. Numerous urinary examinations were made with

negative results. There was no enlargement of the spleen. Some dulness over the lower lobe of the right lung, a few moist râles, and a friction rub were all the physical signs obtained. She failed steadily for four weeks, having persistent vomiting and a temperature frequently reaching 105° F., and then began unaccountably to improve, and was finally allowed to go home. No definite diagnosis was made by the physician in whose care she was. At home she steadily improved, and is now in fairly good health.

The complete and apparently sudden collapse of the kidney in the last case suggests marked interference with its blood-supply.

In the other three cases there was, at any rate, a possible source of infection from below, and, indeed, No. 4 may date from infection during or after labor.

No. 1 had miscarriage after miscarriage, with continued possibility of infection through the bladder. She was also an alcoholic.

No. 2 had an injury resulting in loss of a testicle and prolonged suppuration.

No. 3 became immediately worse after a surgical operation on the genital tract. She was catheterized, had taken ether, and had been ailing since the birth of a child.

Nephrectomy being decided on, shall we remove the kidney by abdominal incision, or attack it from behind and extra-peritoneally?

The first abdominal operations were so terribly fatal that at one time this route was almost abandoned, but lately several surgeons, and notably Maurice Richardson, of Boston, have re-advocated its use, not only with selected cases and large tumors, but as a universal rule.

In a paper read before the Surgical Section of the Suffolk District Medical Society, January 4, 1892, Dr. Richardson, while acknowledging that his experience was small (four cases), stated that he should never seriously think of removing a kidney through the loin, as he considered it a very difficult and dangerous operation. He thought that the danger of hæmorrhage alone exceeded the immediate and remote dangers of the whole operation by the

anterior route, it being impossible to deliver the kidney satisfactorily without the greatest danger of tearing the renal vein and again very difficult to tie the pedicle. He would therefore not seriously consider the lumbar operation upon the kidney where any question of its removal was involved. For the operation of nephrotomy, however, he acknowledged the lumbar incision to be the better.

Unless in pyelo-nephritis and kidney abscess we are ready to advocate immediate enucleation without preliminary nephrotomy, it is difficult to see how this ruling can be accepted, and that there are cases where, by a preliminary incision, the general condition is often so greatly, though perhaps temporarily, improved that the probability of successful kidney removal some weeks later is much greater, can scarcely be doubted. Again, pyo-nephritis may be diagnosed, the kidney consequently incised, and found so riddled with abscesses that it is impossible, without cutting it in pieces, to open them all. Nephrotomy then becomes almost, if not quite, as formidable an operation as nephrectomy, without its compensation, removal of the offending body. Nothing is gained and much lost by delay, and immediate nephrectomy is indicated. Shall an abdominal incision be made with the attendant risk of contaminating the peritoneum, to say nothing of the addition to shock already sufficiently great?

Can the most able diagnosticians invariably differentiate perinephritic suppuration from kidney enlargement, and would any one wish to drain a perinephritic abscess through the peritoneal cavity if it could be avoided? Do we not also find cases in which pus is present both inside and outside the kidney, in which it is even doubtful where it primarily appeared, so that with all signs of an infected kidney we may suddenly open a pool of pus before reaching it?

By straight lumbar incision at the outer edge of the quadratus the kidney is reached by practically blunt dissection in a surprisingly short time, and by curved cuts at one or both ends or by a cross-cut towards the front sufficient room can be obtained without opening the peritoneum, for these cases at least.

James Israel goes even farther, for he advocates¹ the re-

¹ Archiv für klinische Chirurgie, September, 1894.

moval of all kidney tumors, even the most voluminous, by lumbar incision.

After the kidney has been tied off and removed, he, through his incision (made sufficiently large by cuts, transverse or oblique, curved or angular), with large-bladed, long, and brightly polished retractors, brings all parts of the wound into view, so that hæmorrhage can be efficiently stopped and any accidental peritoneal rents repaired.

To early operation, due to more precision in diagnosis and more particularly to the exclusive use of the extraperitoneal method, he attributes his extremely favorable results; results far better than those hitherto reported by any other extensive operator.

With eighty-one capital operations there were but eleven deaths, a percentage of 13.7; and with thirty-seven nephrectomies but six fatal results.

All cases of nephrectomy for renal tuberculosis, hydronephrosis, and renal syphilis recovered.

He lost two patients after extirpation of malignant growths ($16\frac{2}{3}$ per cent. of those operated on), and four after nephrectomy for pyo- and pyelo-nephritis (40 per cent.); a higher percentage than that given in Newman's table, where the death-rate was 27.3 per cent. in forty cases where no calculus was present and 36.3 per cent. in forty-four cases where this complication existed. The mortality after abdominal operation in these cases was, however, in Newman's 234 collected operations 41 and 60 per cent. respectively.

From four cases one should be cautious in drawing conclusions. Fortune or luck has favored me, and I am therefore not yet ready to attack every kidney from the abdomen. From what abdominal operations I have seen (three cases) I am not impressed with the fact that the pedicle is under any better control in this operation than in the lumbar, provided the incision is, in the latter case, made of sufficient extent, and, as one has always the way open to do a combined operation if the lumbar route is a failure, my future operations will be extraperitoneal until I see more light.

The operation (nephrectomy) is a formidable one at the best, and I am prepared in advance for the extreme shock which has with me thus far attended each and every operation.

Prolonged etherization has not been responsible, as in no case but the second (fatal) was more than forty-five minutes consumed, and in Nos. 3 and 4 but thirty and thirty-five minutes respectively.

In both these latter cases the kidney was removed without the capsule, as it was easier thus to peel it out, the capsule being thickened and adherent on every side. This materially shortened the operation without apparently complicating the result.

In future I shall invariably sew the stump of the ureter into the wound after ligating it, and shall limit the amount of traction upon the delivered kidney as much as possible while securing the pedicle, to avoid the misadventures reported in Cases III and IV.

It is to be borne in mind that even true surgical kidney is not always, primarily at least, bilateral (Weir found twelve cases out of seventy affecting one kidney only), and that early diagnosis and operation may save the unaffected kidney and thus a life; that abscess originating in one kidney may, if uninterfered with, through the bladder easily set up ureteritis and pyelitis of the opposite side, with but one possible termination; and that (the patient's condition warranting it) it is justifiable in acute septic invasion of the kidneys to make in one or both sides an exploratory incision, in the hope not only of relieving acute interstitial invasion but also of, perhaps, encountering a larger and well-defined focus of pus, and that even under such circumstances nephrectomy has been successfully performed.¹

¹ ANNALS OF SURGERY, 1894, Vol. XX, p. 609.

A CASE OF CHOLECYSTENTEROSTOMY PERFORMED
WITH MURPHY'S BUTTON; DEATH FROM
HÆMORRHAGE ON FOURTH DAY.

By FRANCIS J. SHEPHERD, M.D., C.M.,

OF MONTREAL,

SURGEON TO THE MONTREAL GENERAL HOSPITAL; PROFESSOR OF ANATOMY AND
LECTURER ON OPERATIVE SURGERY IN MCGILL UNIVERSITY.

OWING to the fact that we only read of the successful cases in which Murphy's button has been used, it seems to me fitting that the following fatal case from a hitherto not much noticed cause should be placed on record. The button was made by J. J. Ryan, of Chicago, and was a No. 1 of the series.

Mrs. J. F., aged thirty-six years, came to me in August, 1894, complaining of jaundice and a swelling in right side of abdomen. She gave the following history:

In January, 1893, had a severe attack of fever, which was followed by jaundice and a very uncomfortable feeling along the right side of the abdomen. Later this feeling developed into a severe pain. After lasting four months the jaundice disappeared entirely.

During the winter of 1894 she again had pains in the right side of the abdomen but no jaundice. These pains were described as of a gnawing character. In June, 1894, was troubled with indigestion, nausea, and vomiting, continuous high temperature, and with pains in right side of the abdomen. In July of this year first noticed a lump in right hypochondriac region and a continuous soreness, which was relieved by hot applications. The lump itself was freely movable and not at all tender to the touch. This lump has been continually increasing in size.

On examination patient was found to be deeply jaundiced, much emaciated, and on examining her abdomen a large pyriform swelling was felt on the right side, continuous with the liver and extending down below the umbilicus. It was elastic and freely movable, and

was dull on percussion, the dull note being continuous with the liver dulness.

Having decided that the tumor was an enlarged gall-bladder, operation was recommended and agreed to. She was admitted into the Montreal General Hospital, and operation was performed August 30. Incision over tumor, which was, as diagnosed, a distended gall-bladder. This was incised, and nearly a pint of bile evacuated, with some very small gall-stones. The obstruction in the common duct was then sought for, and a hard lump found the size of a small almond near the entrance of the duct into the duodenum, and some lumps higher up, which it was supposed might be enlarged glands. The lump near the pancreas was thought might be the obstructing stone; so padded forceps were used to break it up, without result. It was then decided to sew the gall-bladder to the skin incision and insert a drain.

The case progressed well, all the bile, of course, coming through the tube. The patient soon got an appetite, gained flesh, and lost her yellow color. She went home September 29, with the bile still flowing from the wound.

It was suggested that at some future time a cholecystenterostomy might be performed if the bile fistula did not close. The stools were slightly colored.

In three months, November 28, she returned, saying she had never felt better in her life, and she looked strong and robust, having gained considerably in weight since she left the hospital. Her bowels had been irregular, in fact inclined to diarrhoea. She said she was tired of having a continual discharge of bile, and desired the operation I had mentioned to her when she left the hospital in September.

I agreed to perform a cholecystenterostomy, and decided to make use of a Murphy button.

Operation December 3, 1894, assisted by Dr. Armstrong. An incision was made inside the first one, and the bladder was seen attached to the abdominal wall. On examining the site of the lump previously felt, one came down on a large mass, the size of one's fist, which apparently involved the head of the pancreas and duodenum. Being now certain that the case was one of malignant disease, and that all measures for relief could only be temporary, it was decided to unite the gall-bladder with the colon instead of the duodenum, as being easier and more rapid and quite as beneficial. The button was introduced without very much difficulty, the purse-string suture being

first inserted. Owing to the thickness of the gall-bladder there was some puckering, and the parts did not come together without considerable pressure on the button. At one point in the colon where the button could be seen easily through the bowel, a few Lembert sutures were placed. It was decided not to close the fistulous opening which had existed during the past three months, as it was felt this would close of itself after free communication was established between the gall-bladder and bowel. On dropping back the bowel and gall-bladder with the button, there was no pulling or tension, and the parts seemed to be in accurate apposition and to lie comfortably. The wound was closed with layers of buried sutures.

The patient went on well for four days, felt bright, and was cheerful; no sickness, no abdominal distress, and good pulse. There was also no bile discharging from the fistulous opening.

On the morning of the fourth day some blood was noticed oozing through the dressings. This seemed to come from the fistula leading to the gall-bladder and also from the abdominal wound. The blood was bright red, and on squeezing the abdomen gently a huge clot was forced out of the gall-bladder. This was carefully packed with iodoform gauze, and the abdominal wound examined and some stitches removed. Here was also found a blood-clot, but on its removal no further hæmorrhage was apparent.

The same evening my house surgeon called me up, saying my patient was again bleeding freely from the wound. On reaching the hospital I found her much blanched, sighing, and almost pulseless. Blood was rapidly oozing from the fistulous opening and wound. It was decided to reopen the wound and arrest the hæmorrhage if possible. On opening the abdomen a large clot was found about the seat of the anastomosis, and the gall-bladder was distended with blood-clot. There were found no signs of sepsis, the peritoneal cavity being perfectly normal. On examination of the button anastomosis the origin of the hæmorrhage was at once found. The button had cut through the thick and friable gall-bladder and could be easily seen. The hæmorrhage came entirely from the gall-bladder. To remove the button the tissues of bowel and bladder had to be incised and the button unscrewed. Feeling that it would be useless to reinsert the button, it was decided to sew up the incisions in the gall-bladder and colon, and to allow things to remain as they were before operation. The wound in the colon was closed easily enough, but that in the gall-bladder, owing to the friability of the structure, with

greater difficulty. The abdominal wound was closed and dressings applied. By this time the patient was in a very weak condition with the pulse hardly perceptible; so an intravenous injection of saline solution was given with good effect, increasing the volume of the pulse and reducing it to 140.

Next morning patient was going on very well, but towards mid-day another oozing of blood took place, and she gradually sank and died that evening.

Only a partial post-mortem could be obtained, but it was found that the obstruction to the common duct was due to carcinoma of the head of the pancreas. Near the duodenum were numerous glands enlarged and infiltrated. The gall-bladder was full of bile-stained blood-clot, and there was a large clot in the lesser sac.

Since the above was written I have read Dr. Murphy's paper,¹ in which he says that the operation of cholecystenterostomy in malignant disease is very unsatisfactory, as several deaths occurred in eight operations, none, so far as I can make out, from hæmorrhage, though it is well known that the tendency to hæmorrhage in those suffering from carcinoma is very great.

Dr. Murphy also says that now, when he finds a large carcinoma of the pancreas, duct, or neck of the gall-bladder, he abandons the operation. No doubt before long we will find out the limits of the application of the button. Its use ought certainly to be avoided in cases of obstruction due to malignant disease.

¹ Philadelphia Medical News, February 9, 1895.

A SURGICAL CRUTCH WITH ADJUSTABLE LEG-RESTS.

By F. TILDEN BROWN, M.D.,

OF NEW YORK.

AS an improvement upon the long-used Clover crutch, the apparatus here shown is offered. It has been tested for nearly a year at the Presbyterian Hospital, and found to possess the advantages described.

The main faults in the Clover crutch are the straight bar and the neck-strap.

The former seriously invades the operative territory. In urethrotomy it is near enough to the penis to encroach upon some part of the arc which the handle of a sound or grooved staff must traverse to enter or leave the urethra. It invariably causes the operator to use undue force and a false lateral position to crowd the handle of the instrument under the bar.

In operations upon the rectum, perineum, or vagina this straight bar, hung with sterilized cloths, shuts off light from the field of operation, and fills the space convenient for instruments.

The single neck-strap is faulty in that it exerts a considerable pressure upon the vessels and nerves of the neck, the deleterious effects of which are clearly marked in the congested state of the head and the unsatisfactory respiration during anæsthesia. These phenomena are particularly noticeable when the patient is flabby, plethoric, or alcoholic,—that is, it intensifies the dangers incidental to the anæsthetic state commonly noticed in just such cases.

To obviate these objections to the old apparatus, an extension bar, with right-angled elbows, continued into parallel arms, six inches long, has been substituted. These arms swivel in the collar of the metal leg-crutch. By this means the extension-bar

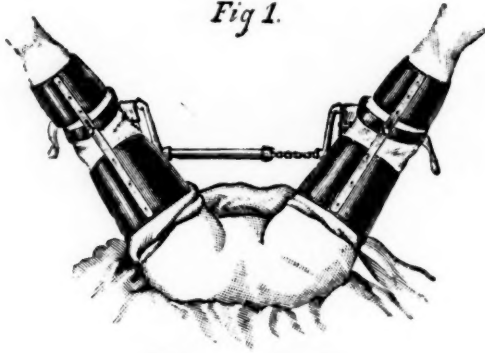
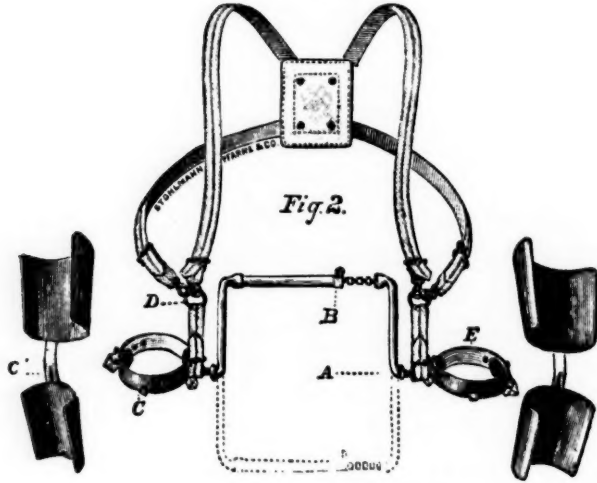
Fig 1.*Fig 2.*

FIG. 1.—Showing exposure of the perineum and position of the legs with the author's surgical crutch applied.

FIG. 2.—Component parts of the author's crutch.

- A. Point at which the arms of the extension-bar swivel in the leg-crutch.
- B. Spring pressed upon to close the extension-bar.
- C. Key on the leg-crutch which engages in the slot C' in the leg-rests and locks them together.
- D. The point where the two parts of the apparatus are joined by ring- and snap-catches when the crutch is on and the thighs are flexed.
- E. Canvas strap which buttons over when the leg lies in the crutch.

Dotted outlines show the position of the extension-bar if turned downward.

As only canvas straps and nickelled metal enter into the make-up of the apparatus, it can be washed and sterilized.

can be turned well out of the way. It is ordinarily kept flat upon the patient's abdomen. The former thumb-screw on the extension-bar has been replaced by a spring-catch, which, in spreading the thighs to the desired degree, is automatic, and maintains the position, the spring needing only to be pressed upon when the thighs are again to be adducted.

Instead of a single neck-strap with two buckles, as used in the original Clover, counter-extension is effected by both neck and side straps radiating from a back pad. When the thighs are once flexed, all of the traction should be maintained by the two side straps, no pressure at all being exerted upon the supra-clavicular region by the neck-straps.

To make the attachment and detachment of the straps and leg-crutches, rings and snap-catches are used, supplemented by buckles for tightening the harness when on, but only the two lateral straps should then be buckled up tighter; this wholly relaxes the neck-straps.

The drooping downward and inward of the feet is also troublesome; for while the knees are bent, the more the thighs are abducted, the greater the approximation of the feet. In the hospital amphitheatre, where it is particularly desirable to afford a large visual angle of the operative field, this encroachment of the feet and lower legs is quite annoying. To avoid this, extreme knee flexion must be prevented, and the leg-rests, which button on to the leg-crutches, are introduced to obviate it. These leg-rests are made of light metal, coupled by a slightly-angled strong steel brace. These permit the natural knee flexion necessary when the thighs are also flexed.

The feet and legs are now well out of the way of assistants and the eyes of the gallery. But this raising of the centre of gravity makes it more necessary than ever that a nurse should constantly steady the body, by standing at its side and holding the extension-bar as it lies on the patient's abdomen.

I desire to thank Mr. Brunner, of Tiemann & Co., who has been very attentive in perfecting the details of the apparatus.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, January 23, 1895.

The President, ROBERT ABBE, M.D., in the Chair.

CASE OF CHARCOT'S JOINT-DISEASE.

DR. F. KAMMERER presented a man, aged forty years, with the following history: Family history negative. No evidence of syphilis. Sixteen months previously had suffered a severe contusion of his left knee, which remained red, painful, and somewhat swollen until one year ago, when he slipped off from the wheel of a coach, striking the same knee on the iron tire. The knee at once became immensely swollen, red, and painful. After both injuries to the joint the patient was able to get up and walk, especially after the first.

Under treatment the swelling continued to subside, and the pain disappeared in a few weeks. Since then the condition of the knee has remained stationary, the latter neither increasing nor diminishing in size, and pain has entirely disappeared. Can walk on his leg, but does not feel steady; the knee "seems to give way." On November 17, 1894, patient fell and broke his left leg near the ankle, where union of the bones occurred without any delay, however.

At present the knee is considerably enlarged; the swelling is especially marked on the front and inner side, less on the outer side of the knee. The swelling is hard, osseous, probably connected with the internal tuberosity of the tibia and with the patella, which it is impossible to locate definitely.

The joint is absolutely painless; motion is free. The leg can be voluntarily flexed to nearly a right angle; extension is complete. Passive abduction and adduction of about thirty degrees is possible with the limb in complete extension.

The patient has noticed no difficulty in walking in the dark. His gait is ataxic. The body sways considerably when patient stands

with eyes closed and feet together. There is complete loss of knee-jerk. Pupils do not react to light (Argyle-Robertson). Complains of no shooting pains. No crises. No optic neuritis.

There is a shortening amounting to an inch and a half, due in part to the fracture and in part perhaps to disappearance of the articular surfaces of the knee-joint. Dr. Kammerer had no doubt but what the case was one of arthropathy in connection with locomotor ataxia. He remembered that five or six years ago Dr. Willy Meyer had resected the knee in a case of this kind, but he could not recall the ultimate result. In the present case the point of motion in the joint was above the tumor, the latter moving with the tibia. It was difficult to make out the patella.

DR. ROBERT ABBE remarked that osteophytes were common in the Charcot joint, but in this case they were unusual in extent, and seemed to be the patella spread out like a mushroom. There was no indication for resection at present, but he saw no reason, should it be required later, why the resected ends should not unite just as did fractured long bones in locomotor ataxia. At any rate that argument had been advanced in favor of resection, and personally he did not think locomotor ataxia was a contra-indication to operative interference.

DR. W. B. COLEY said he had seen Dr. Meyer's case within a week or two. Bony union had not taken place. There was fairly good action in the leg.

THE OPERATIVE TREATMENT OF HERNIA, WITH REPORT OF TWO HUNDRED CASES.

DR. W. B. COLEY read the paper on the above subject. (See page 389.)

DR. C. K. BRIDDON remarked that he thought Dr. Coley ought to be proud of his results in the operative treatment of hernia. He had not been aware that it was possible for them to be so good. He had himself operated only a few times by Bassini's method, but this small experience had led him to regard it as far superior to other methods.

Regarding hernia of the funis, he also had seen one case and one only. It was a long time ago. The child when a few days old was brought to the hospital with a hernial tumor at the umbilicus as large as his fist, and curiosity, he might say, led him to cut into it and attempt to reduce it, but the intestines were found so matted

together that it was almost impossible to separate them, and the reduction was only effected by enlarging the hernial aperture. The child died within two or three days.

DR. A. G. GERSTER had performed Bassini's operation twenty-seven times, and, although a sufficiently long period had not elapsed since the first operation, a little over two years ago, to justify drawing conclusions, yet he was convinced that the results would prove as good as, if not better than, those obtained from Kocher's method, which he had performed for about two years previously, or from Macewen's, which he had practised for five or six years before that. He might say, however, that he had obtained good results from all of these methods in favorable cases, but there were some cases in which all methods would fail. He believed Bassini's was based on a solid foundation, and that it would give better results in general than others which he had hitherto practised.

Regarding suture material, he had used silk, which he had found easy to handle and followed by good healing. It was not absorbable like kangaroo tendon, but he thought that was an advantage, since in his opinion the sutures aided considerably in resisting the internal pressure against that part of the walls.

He had been operating upon children for hernia a number of years. Indeed, his first operation upon a small child dated back as long ago as fourteen years, and he had operated upon eight or nine cases since. There had been no relapses. If all radical operations were done at that early date, all cases of hernia would be cured, but to maintain asepsis in children was rather difficult.

Lately, however, he had employed an expedient which had proved very useful. Iodoform gauze was placed over the wound and then painted with collodion, and over this were placed two or three layers of rather stout rubber tissue, which was made to adhere to the skin by painting with chloroform. Even urine flowing over it did not soak through and contaminate the wound.

DR. F. KAMMERER had used Bassini's method exclusively the past three years, had operated upon about fifty cases, and in none of the few which had continued under observation had there been recurrence. He had had some recurrences from methods used previously,—Macewen's and McBurney's,—but also some permanent cures. He had invariably used silk, but the arguments which Dr. Coley had brought forward would lead him to try kangaroo tendon. Although he had been most careful, sterilizing the suture material im-

mediately before operation, yet suppuration had followed the use of silk in some cases, and in some instances fistulous tracts had formed after primary union seemed to have been assured. Owing to the stiffness of silver wire, and especially silkworm, he thought these materials were not adapted for buried suture. He had been astonished to hear that Dr. Coley had never seen fistula produced by kangaroo tendon, for it certainly remained long enough, three months, according to the doctor's statement, to produce such a result as well as any other suture material which now and then was not entirely aseptic.

The speaker could not quite agree with Dr. Gerster regarding the value of the dressing which the latter had recommended. In his opinion the abdomen ought to be given more support than was guaranteed by a superficial dressing simply attached to the skin in the immediate vicinity of the wound.

DR. BRIDDON remarked with regard to silver wire, that he had used it in several cases of ventral hernia, always with satisfaction. He was not aware that protrusion had taken place in any of the cases, and the sutures had never caused any trouble. On examining the wound after all plastic material had become absorbed, one could hardly feel the sutures. He placed them very close together. The same result was true in his experience with silkworm gut. He could not understand what advantages kangaroo tendon possessed over silkworm gut for buried sutures. One could be made as aseptic as the other, and in many cases non-absorption was a decided advantage. He would, however, try kangaroo tendon.

DR. ROBERT ABBE thought Dr. Coley's mortality record most remarkable,—only one death in 200 cases, and that due to pneumonia, practically reducing it to *nil*. In this regard his own experience had not been so favorable, but it covered a period during which various methods had been employed, and when aseptic work had not been as perfect as to-day. He had probably operated 175 or 200 times, the number of cases when he had last looked over his records having been 150. He had done Bassini's operation only a few times. He still liked Macewen's, and believed that with the use of kangaroo tendon it would give as good results as Bassini's. Heretofore it had been faulty because performed with heavy catgut, which certainly was not an enduring suture. The kangaroo tendon was very stable, it could be tied very tightly, it buried readily, and gave perfect coaptation,—facts which were necessary to successful operative treatment.

DR. COLEY said he had admitted in his paper that silk could be buried without causing any trouble as a rule, but in a certain number of cases it did cause sinuses. The records of the cases observed at the Hospital for Ruptured and Crippled was sufficient proof of this.

Regarding the dressing employed by Dr. Gerster, he thought it objectionable in that it did not exert any pressure over the wound. He was himself particular about putting on a spica dressing, which exerted firm pressure. There was less danger under such circumstances of accumulations of blood and serum, which would invite suppuration. In six cases complicated by Pott's disease, also in the five cases of strangulated hernia in infants under two years, the dressings were constantly soiled by the urine, yet there was primary union in every case.

Dr. Coley had had no case of sinus following the use of kangaroo tendon. Suppuration had occurred in seven instances, but it was during immediate wound-healing, and not as a sinus developing some time after operation, as was the case with silk. He did not agree with Dr. Briddon, that it was necessary for the suture to remain two or three years. If one obtained primary union, two or three months would do just as well. Every strain put upon the abdomen must cause tension, and the silk or silver wire, if used as suture material, would cut through the tissues, until such tension was overcome.

HYSTERECTOMY FOR UTERINE FIBROIDS: TWO SPECIMENS.

DR. CHARLES K. BRIDDON presented two specimens of uterine myofibromata removed through an abdominal incision. In each case total ablation of the uterus was done, and vaginal drainage with iodoform gauze was used. A smooth recovery followed in each instance.

SARCOMA OF CAPUT COLI: RESECTION.

DR. ROBERT ABBE presented an apparently sarcomatous mass, including the caput coli, appendix, and part of the ascending colon, —altogether about a foot of the intestine,—removed from a boy six years of age. There had not been time to examine the specimen microscopically in order to decide whether it was sarcomatous or carcinomatous. Up to a week ago the boy was not known to be ill.

Then, after coasting, he began to suffer apparently from colic, and the family physician was sent for. On examination a large mass was felt in the abdomen. The patient was seen by Drs. Jacobi, McBurney, Packard, Tucker, and Abbe, and the mass in the right loin was diagnosed as sarcoma, probably of the kidney. Dr. Abbe operated, and found the neoplasm involved the intestine and glands, as already stated; end-to-end anastomosis was established by Murphy's button. The boy succumbed to the late shock of the operation thirty-six hours later. Further examination showed the most intimate relation of the tumor mass with the posterior wall of the caput coli.

COLLAPSING DERMOID CYST.

DR. ABBE presented a second specimen, consisting of a dermoid cyst. The patient had been bedridden since her last confinement, two years ago, at which time she had pelvic peritonitis. There had been no apparent cause of her continued illness. After dissecting up the pelvic viscera, Dr. Abbe finally discovered a collapsed cyst in the hollow of the sacrum, about the size of an orange, its lumen connected with a loop of small intestine. It was a dermoid of the ovary, and contained teeth and hair. Evidently the opening into the intestine had occurred during confinement two years before. During the day and while walking about, the woman has constantly noticed a swelling in the lower part of the abdomen, which disappeared when she lay down at night, showing that in the erect posture the intestine emptied its contents into the tumor, while in the recumbent posture the tumor emptied itself into the intestine. The opening into the gut, which was large enough to admit the end of one's finger, was closed, and the woman made an uneventful recovery.

In connection with this case Dr. Abbe referred to another seen ten days ago. There had developed suddenly peritonitis with a tumor the size of the pregnant uterus at the fourth or fifth month. He saw the patient on the fourth day, at which time the tumor had entirely flattened so that it could not be recognized. The woman suffered from a degree of prostration entirely unaccountable in the absence of fever. The appearance was leaden, being more like that from absorption after hæmorrhage than from sepsis. With the consent of Dr. Jacobus, with whom he had seen the woman, she was removed to the hospital, where Dr. Abbe operated and removed a large ovarian dermoid, the size of a cocanut, which had become strangulated, gangrenous, and had ruptured. There was universal peritonitis, with

infection and lymph adhesion. As soon as he opened the abdomen the oily-looking contents of the ruptured dermoid rose to the surface. He removed the tumor with ease, thoroughly flushed the cavity with saline solution, and the patient made a good recovery, without rise of temperature. While there had been plastic lymph everywhere over the intestines, the peritonitis had not been of a septic nature, which might account for the absence of temperature throughout the case.

DR. GERSTER wished to put on record a case of dermoid which had ruptured into the intestine. The patient, a widow, forty-eight years of age, had come under his care a year ago last spring. She had long suffered from some pelvic trouble, and had been carefully examined by gynecologists. A mass could be felt distinctly through the vagina, occupying the left side of the small pelvis, evidently attached to the uterus. Under anæsthesia fluctuation was distinct, from which it was inferred that there was more than a fibroid which had been recognized before. The size of the tumor varied, and sometimes it disappeared altogether. Before such times the patient suffered from an attack of fever, sometimes accompanied by chills, and a large quantity of pus would be evacuated by anus. It happened that the last gentleman who had examined her before him was Dr. Mundé, on which occasion the cyst was empty, and inasmuch as he could find nothing he declared her to be a well woman. In this opinion he was justified by the physical condition at that time. Still, she was not well, and finally Dr. Gerster proposed an exploratory incision. He found a dermoid which contained a ball of hair and some extremely offensive pus, the latter circumstance, he said, being due, of course, to the communication with the sigmoid flexure. The closure of the intestinal aperture did not prove as difficult as he had expected. Since some of the offensive material had escaped into the pelvic cavity, he did not dare close the abdomen, but introduced gauze-packing. The woman entirely recovered.

PROPERITONEAL HERNIA.

DR. F. W. MURRAY related the following case: A man entered his service last summer at the New York Hospital, with the history that three days before a right inguinal hernia suddenly appeared, and symptoms of strangulation soon followed. The family physician was sent for, gave chloroform, and said that he had reduced the hernia, but the patient asserted that he was not relieved. Pain and vomiting continued, and on the following day he visited a truss company,

where, under taxis, the hernia was apparently reduced and a truss applied. No relief followed, and the next day he was brought to the hospital. The patient presented all the symptoms of intestinal obstruction and was in a condition of great prostration. The abdomen was distended, tympanitic, and painful on pressure. There was no fulness or swelling in the inguinal region, the inguinal canal was empty, and on deep pressure with the finger no tumor could be felt on coughing. Under ether and in Trendelenburg's position the abdomen was opened through a median incision. A coil of distended small intestine presented, and, on following it downward, it was found constricted at the right internal abdominal ring. There were no evidences of gangrene of the gut at this point and no adhesions. The gut above the ring was red and swollen, while the segment below the point of constriction was pale and collapsed. By means of gentle traction exerted on the lower segment the hernia was easily reduced. The strangulated loop of gut was about four inches long, deeply congested, and in fair condition. On introducing the finger into the ring it passed upward into a cavity lying between the peritoneum and abdominal wall. Owing to the weak condition of the patient the abdominal wound was quickly closed, and all attempts at radical cure were deferred. Vomiting ceased, some gas passed by the bowel shortly afterwards, but the patient succumbed to shock six hours later. The case was evidently one of acquired properitoneal hernia due to rupture of the neck of the sac at the time taxis was employed at the truss company. The man's condition on admission to the hospital was far from promising, and the operation was performed with a faint hope of success. Had he been seen earlier and had he not fallen into the hands of the truss vender, the result might have been different.

DR. BRIDDON asked Dr. Murray whether he would operate again in this way if he were confronted with a similar case. Was it not safer, where one had a case of strangulated hernia which had been reduced *en bloc* with no alleviation of symptoms, to go down upon the canal through which the hernia had passed than to open the abdomen and draw out the gut whose condition might be questionable? Would not the latter method expose the patient to the danger of infection? Of course, he said, it was much the easier method, and he could understand that it might be indicated in cases of double inguinal hernia where it was not known on which side the difficulty lay.

DR. GERSTER believed this question had been discussed within two years in medical literature. He remembered especially that Lawson Tait had advanced the idea that the proper way of doing herniotomy was through the abdominal cavity, just as another gynaecologist had contended that the proper way to remove a diseased kidney was through the abdominal cavity. Dr. Gerster regarded this as a one-sided statement of the case. In his opinion the approach should be from the direction which appeared for the individual case the most rational one. As to the point just raised by Dr. Briddon, Neuber had published two cases in which he was compelled to open the abdomen, because, although convinced that there was hernial strangulation, he could not tell on which side. Dr. Gerster thought that under such circumstances it was best to make a simple abdominal incision in order to ascertain the exact condition of things, but after learning this the hernia should be approached in the usual way. This would be safer than to withdraw the gangrenous or partially gangrenous gut into the peritoneal cavity, although it could not be denied that this could be done with comparative safety against infection by walling off the rest of the cavity with gauze.

DR. KAMMERER did not believe that the plan of opening the abdominal cavity some distance from an incarcerated and gangrenous hernia was to be condemned in each and every case. He could understand the propriety of introducing some gauze intraperitoneally about the constricting ring to prevent an infection of the peritoneal cavity before cutting through the constriction. Even in relieving the latter by dissection from without, it can occur that a gangrenous furrow in the intestine will give way at that very moment, and infectious material will escape into the peritoneal cavity, if some means have not been taken to arrest it. This he considered not merely a theoretical speculation.

DR. MURRAY said that in the event of a similar case his treatment would be the same as in the case narrated. When symptoms of strangulation persist after the reduction of a hernia the cause is to be found in one of several conditions. Through an abdominal incision not only can a quick and thorough examination of the internal ring be made, but also the particular cause of strangulation can be readily ascertained. For this reason he preferred abdominal incision to cutting down through the inguinal canal. In the case narrated the hernia was reduced by traction from within, as there were no signs of gangrene and the gut was not tightly constricted. Had the intestine

appeared gangrenous or even doubtful, it could have been approached from without through the inguinal canal. He agreed with Dr. Gerster that ordinarily it might be best to make the approach from without, but in this case traction from within was safe for the reasons already given. The patient did not die of infection but of shock, and in the opinion of the narrator the treatment pursued was in accord with sound surgical principles.

DR. KAMMERER believed it was Mikulicz who had advised laparotomy in the first instance where one suspected gangrene, as where the strangulation had existed a number of days. On finding the loop of gut, tampon all round, then divide the constricting ring. Mikulicz considered it dangerous to incise the constricting ring from the direction of the hernia where there was gangrene. Dr. Kammerer was also of this opinion.

DR. GERSTER said he had advocated, practised, and described this method ten years ago. There was nothing new in Mikulicz's suggestion. The entire region above and below the constricting ring should be freely exposed by dividing the tissues from without inward, not by dividing from within outward. The peritoneal cavity should be freely opened above the hernia, this being, as all would admit, the only safe procedure. But that was different from performing laparotomy for the cure of hernia, as Mr. Tait advised.

Stated Meeting, February 13, 1895.

The President, ROBERT ABBE, M.D., in the Chair.

SOME MOOT POINTS IN THE TREATMENT OF APPENDICITIS.

DR. L. A. STIMSON said there were some points in the treatment of appendicitis which were still under discussion, and it was in connection with one or two of these that he presented a patient and two specimens. The principal point concerned the behavior of the appendix after a suppurative process had taken place, and the resulting abscess had been evacuated. The question arose from time to time whether it was advisable in such cases to make any search for the appendix, owing to the risk of breaking down adhesions which protected

the abscess from the general peritoneal cavity; whether it was not best to leave the appendix and trust to its destruction by the process which had given rise to the abscess.

The man presented was thirty-three years of age, was admitted to the New York Hospital January 3, 1895, with the history of having been operated upon during an attack of appendicitis, eight months previously. He bore the scar of that operation. It was stated to him at the time that it was a suppurative case, that pus was evacuated, and the appendix was gangrenous. The operation was done in one of the hospitals of the city. The wound healed fairly well, but was followed by a distinct hernia in the line of the scar. Five months subsequently, last October, he had another similar attack, general tenderness over the abdomen, some distention, vomiting, fever. He remained abed four weeks, then passed a large amount of pus and blood per rectum. Subsequent rapid improvement and complete recovery in two weeks. He then remained perfectly well until a week before admission to the New York Hospital, when he had a less severe attack, and remained abed four days. He then sought admission to the hospital for complete relief from recurrence, and also relief from the hernia.

The scar was in the usual situation, and in its central portion was a protrusion, apparently of omentum. Dr. Stimson made an incision to one side of the scar, opened the hernial sac, found it occupied by omentum which was firmly adherent at many points. He finally made his way into the abdominal cavity, and was surprised to find the appendix in plain view, without any adhesions, or at least with only very slight adhesions. It was long and thick, and lay directly beneath the scar, practically entirely free within the abdominal cavity, and this notwithstanding the history of two suppurative attacks of appendicitis. He excised the appendix, and could find no indication of a perforative process except at one point, near its base, where it was very thin.

He also excised the scar, separated the abdominal planes, and brought them together as if it were a fresh case, without any hernial protrusion. The man now has a firm cicatrix.

The point to which he wished especially to direct attention was the fact that this man, after two attacks of suppurative appendicitis (one certainly suppurative, the other presumably so), had a large appendix lying free within the abdominal cavity, and just as capable of giving rise to all the consequences of appendicitis as though he had had no previous attacks. In other words, his two attacks had done nothing to protect him from recurrences.

About a week later another patient had come to him with a somewhat similar history, a history of having been operated upon for suppurative appendicitis three or four years ago, with prompt recovery. He remained well up to the time of the recent attack, which brought him to the hospital. He was suffering from a moderate amount of abdominal pain and distention. A tumor was felt in the hypogastrium and through the rectum, but because of the abdominal tension its size and relations could not be satisfactorily determined until the patient was put under ether. Previously he had been inclined to regard it as a neoplasm. Under ether the mass felt much smaller and was more movable. He then suspected suppurative disease, probably originating about the appendix. Median incision; on making his way down slowly through the mass of adherent intestines he came upon pus, which was evacuated through a small opening. After the pus had ceased to flow, he enlarged the opening, and in the abscess cavity found a small fecal concretion. On further careful cleansing of the abscess cavity, he saw at its bottom a small red mass which looked very much like inflamed intestinal mucosa. On pressure pus welled out of it. It proved to be the appendix completely separated from the cæcum and imbedded in adhesions in the true pelvis. He pulled it out, and now showed it to the Society. The patient made a good recovery.

In view of experience like this, Dr. Stimson thought we should not be in haste to be satisfied with the simple evacuation of an abscess which had formed about the appendix, but that search should be prosecuted with a view of removing the appendix provided it were not attended by serious obstacles and dangers.

DR. JOSEPH D. BRYANT said he had seen a case of appendicitis about three weeks ago the like of which he had never seen nor heard before. The patient had first entered Bellevue Hospital last summer with a large abscess in the right iliac region, was operated upon by Dr. Alexander, who failed, he was informed, to find the appendix. About three weeks ago the man came under Dr. Bryant's observation, having a gaping opening in the abdominal wall at the site of the incision about two inches long; its edges were indurated, and at the middle there protruded above the surface a body about the size of the end of his little finger. It was freely movable from side to side, was attached to the deeper tissues, and was suspected to be the appendix. Two weeks ago he dissected it out and found that it was the appendix. Another interesting fact in connection with the case was that

Professor Dunham, at his request, made a very careful examination of the specimen for evidence of previous perforation; the history of abscess had been very distinct, and many ounces of pus had been removed by Dr. Alexander. But Dr. Dunham was unable to find any evidence whatever of perforation.

DR. FOWLER had met with two cases which were quite corroborative of the dictum which he thought should now go forth, that the appendix should be removed whenever it could be found, provided the surroundings were such as to justify breaking down adhesions in searching for it. Last summer a young farmer at Bayshore was taken ill with appendicitis, and Dr. Coe, who happened to be spending his vacation in the neighborhood, saw him about the ninth day, evacuated a considerable amount of offensive pus, and made a reasonable search for the appendix, but did not find it. The abscess cavity was drained, the wound was left open to granulate, and the patient made a good recovery. About three weeks ago the man entered a hospital in Brooklyn, with a large abscess in the right iliac region. Upon incision the appendix was found behind the cæcum, extending upward towards the liver, a distance of about four inches and a half. This was supposed to be the end of it, but on carefully lifting it out of its adhesions it was found to be reflected upon itself, and to measure nine inches in length. The appendix was considerably infiltrated, but showed no evidence of perforation, although this large abscess was present. An interesting question was, whether the infection had remained over from the former attack, or had he a second attack of appendicitis. The former possibility seemed to be supported by the fact that the patient had not suffered from the acute symptoms at the second attack, which had been present at the first; also by an experience with another case, as follows: He had opened a large abscess, removed the appendix, partially closed the wound, and drained the deeper pelvis. Three months afterwards the patient presented herself again with what seemed to be a right pyosalpinx. Laparotomy, however, revealed an abscess behind the uterus, there being no involvement of tubes or ovaries. The abscess seemed to have been the result of the first infection, some of the infectious matter having been retained, and remained latent until such a time as lowering of the vitality of the tissues in the neighborhood gave opportunity for suppuration.

A case somewhat similar to the first was that of a patient on whom he had operated for appendicitis five or six years ago with-

out finding the appendix. Two and a half years afterwards another attack occurred, there was rapid suppurative peritonitis, and the patient died.

He was sometimes asked by life-insurance people whether a person who had had an attack of appendicitis, the formation and evacuation of an abscess, and healing of the wound by granulation, the appendix not having been removed, was a good risk. At one time he had believed that the amount of inflammatory and suppurative process involved in the formation of the abscess was sufficient to destroy the appendix; but he had since changed his mind, and believed that if possible the appendix should be removed, and if it were not the patient should be informed of his danger and of the necessity of having the appendix removed between attacks, should there be recurrences.

DR. RUSHMORE thought there was something to be said on the other side of the question. Would it not be better to do as Dr. Stimson had done in this case, search for the appendix on a subsequent occasion? At the time of the occurrence of the first abscess the adhesions were easily broken, and a very thorough search or even a moderate search for the appendix would be likely to break up the adhesions and give rise to the very thing which we operated to avoid. But by simply opening and cleansing the abscess, and, making a reasonable search for the appendix and not finding it, packing the wound, the chances were largely in favor of the patient getting well. The mortality from opening an appendicitis abscess without further operative procedure was small. It was not certain that another attack would occur, but, if it should, the adhesions would be older, the peritoneal cavity would be walled off better, and the appendix could be sought for with greater safety.

Dr. Rushmore referred to two cases having some bearing on the discussion. In one he had opened a large abscess, had seen the appendix, which was gangrenous, and removed it with the finger. A year afterwards Dr. Mynter, of Buffalo, wrote him that the patient had come under his observation with all the symptoms of appendicitis, and inquired what he had done. He learned afterwards from Dr. Mynter that the attack had subsided and the patient had no further trouble. In another case the abscess discharged spontaneously. The patient went to Philadelphia, where Dr. Ashhurst operated upon him, and it was said an opening was found in the appendix.

The point which Dr. Rushmore wished to make was that in many

cases of suppurative appendicitis it would be safer not to make an extended search for the appendix until a second attack.

FRACTURE OF THE PATELLA TREATED BY MASSAGE.

DR. HOWARD LILIENTHAL said, in presenting a patient, a woman about twenty-eight years of age, that he did so because she had had a fracture of the patella treated in rather an unusual way,—that is, by massage. On February 20, a year ago, she was sitting in a window cleaning the glass, when she fell backward a distance of a little over six feet, sustaining a fracture of the left patella and also an injury of the right wrist and of the scalp. He saw her after about six hours, when there was enormous effusion into the knee, preventing exact diagnosis. He put on an Esmarch-Martin rubber bandage from the foot to above the knee, and on removing it half an hour afterwards, the swelling had been so far reduced that he could easily make out transverse fracture of the patella. There was little separation, and by drawing upon the upper fragment it could be approximated to the lower and crepitus elicited. A posterior splint was applied. Next day she was transferred to hospital, and he began treatment by massage of the entire limb, particular attention being paid the parts about the knee and the quadriceps. During this time a posterior splint was worn and a figure-of-eight bandage, the dressings being removed only while practising massage. The massage was continued ten minutes or longer, and was repeated twice a day, the fragments being held in apposition by an assistant. He had learned of the method from Koenig's "Surgery," fifth edition. The patient was allowed to get up on the tenth day, to walk on the eleventh, still wearing the bandage. Was discharged at the end of the fourth week and allowed to go up-stairs on the fortieth day, massage having been continued during the entire six weeks. The result had been so perfect that one would not recognize there had been fracture of the patella unless the knee were compared with its fellow. The left patella, however, was longer than the right, although it was not easy to feel a furrow between the fragments.

OPERATIVE TREATMENT OF FRACTURES OF THE PATELLA.

DR. GEORGE RYERSON FOWLER read the paper of the evening, entitled "A New Operative Method in Fracture of the Patella." (See page 621.)

DR. STIMSON said he would limit his remarks to two or more

of the many points raised in the paper of Dr. Fowler. In the first place, while Dr. Fowler's patient was a striking example of the ill results of non-operative treatment, it should be remembered that such results were extremely rare. As a rule, the non-operative treatment of fracture of the patella gave very good functional results, although bony union did not occur except possibly in very rare instances. The pathological conditions in fracture of the patella differed widely in different cases, and now and then the fragments were so far separated that even a good functional result was not obtained. He did not think one could predict a probable good or bad result based upon the presence or absence of a fringe of tissue between the fragments as determined by crepitus. He had exposed a good many fractured patellæ by incision after having elicited crepitus, and in the vast majority he had found a fringe of tissue between the fragments.

In most the fringe is small, either a narrow strip running all across the anterior edge of one fragment or a broader one running partly across. In one he had seen a long ravelled strip of fascia, three or four inches long, folded between the fragments. In some cases the torn fragment was so tilted that a good result would have been impossible without operative treatment. Nevertheless, the great majority of patients obtained a good functional result by the non-operative method of treatment, as had been demonstrated before this Society many times the past ten years. The case of Dr. Lilienthal was the most recent. He recalled the case of a patient in whom he had found a distance of four inches between two fragments of the patella, and when the patient was asked whether he knew there was anything the matter with it he answered no. The fracture had occurred four years before. Of course, Dr. Stimson said, he had been depending upon the other knee, and, therefore, had not notably felt the inconvenience of the separation between the fragments on the affected side.

Regarding the operation, Dr. Stimson agreed fully with the reader as to the inadvisability of using wire in suturing the patella. He thought the practice had been based upon an erroneous opinion as to the strength required to hold the fragments together. He happened to have a hospital service in which fracture of the patella was very common, and he had reported cases to the Society from time to time in which various methods had been resorted to, but during the last four years he had been employing an operative procedure which he had not yet described.

In looking over the reports of the Chambers Street Hospital it appeared that he had operated by this method in thirty-six cases, to which number about a dozen more cases might be added. The thirty-six cases had given him uniformly good results. Of course, he had not seen all of them later than two months after the treatment, but all had been able by that time to bend the knee to a right angle and to walk. The method employed was a modification of one previously described, adding facility and other advantages. A longitudinal incision was made along the centre of the limb from just above the patella to just below it, being carried down to the rupture in the soft parts in front of the bone, so that the blood could be evacuated. The fringe between the bone was lifted out and cut off where necessary. The fragments were brought together and held in apposition by silk suture passed on a curved needle through the ligamentum patellæ close to the lower end of the patella and through the tendon of the quadriceps above so as to make a double loop, catching the quadriceps above and the ligamentum patellæ below. The loop was then drawn taut and tied, lying, not in the joint, but in front of the patella. The operation could be carried out without touching the tissues with the fingers, which were the chief source of infection in operations. The skin was closed by continuous silk suture; no drain; posterior splint and dressing. These were removed after a week, the stitches were taken out, and the limb was put up in plaster. The patient was sent home after two or three days, and the splint was removed a month after the injury. It was then worn during the day for another month and left off at night.

During the last few months he had occasionally modified this procedure by substituting for the mediate silk suture simple catgut suture of the fibro-periosteal layer on the front of the bones. The result had been satisfactory. One man was carried through a violent attack of delirium tremens the first week, the fragments were not pulled apart, but the union was not quite as close as in some other cases, and slight mobility could be detected between the fragments at the end of a month, which was not true of the other cases. The separation of the fragments in fracture of the patella was not due, he said, to contraction of the quadriceps, but to effusion in the joint. This might account for the benefit derived from massage as practised so extensively by the Dutch and a few German and French surgeons. In one case, while he was applying the suture under cocaine, the man struggled violently, even lifting the leg, yet the fragments did not

separate more than a quarter of an inch. In other words, a violent pull upon the quadriceps had not separated the broken patella more than a quarter of an inch. If, then, they were not separated by the effusion, they were not likely to be pulled apart by the quadriceps. The elastic bandage will often remove the effusion rapidly, and he had got good results in a few cases solely by its use and immobilization of the limb; and at one time he was disposed to think this would prove a good way of treating the average case, but he found that in one or two instances it did not do well,—because, he supposed, there was interposition of too much tissue,—and he abandoned it. It seemed that in Dr. Lilienthal's case the effusion disappeared promptly after application of the bandage, which led him to think that massage had had little to do with the result except by promoting absorption of blood and favoring repair.

To sum up, he did not think we ought to recommend operative treatment, no matter how safe, for general use. Our success did not mean that we could do operations and others could not. It meant that here we were working in hospitals, with trained assistants and nurses, and people who were in the habit of taking all precautions necessary in preparing for operation. Consequently we could bring to bear much greater security than men could do who were operating less frequently and out of hospitals. They could not control their assistants and the many conditions so necessary to success. He did not think we should recommend for general acceptance an operation attended by such risks as Dr. Fowler had pointed out, when non-operative interference gave such good results.

Finally, as to the operation itself, of course he believed in the one he was doing himself, otherwise he would not be performing it. Wire was faulty, and was unnecessary because experience had taught him that the fragments could be held together without much strength. Catgut passed through the fibrous tissue would answer in some cases. The presence of wire in the bone was itself opposed to prompt and uneventful union of the fragments. It promoted absorption of the bone and thus weakened it. If an operation were done, it should be on the line of minimum interference.

DR. BRYANT said that with the main propositions of the paper of Dr. Fowler he was quite in accord. The quadriceps extensor could be divided, for the purposes of discussion, into three portions: First, that of the rectus, which is inserted into the upper portion of the patella; second, by two divisions, one on the outer and the other on

the inner side, which respectively pass at either side of the patella, and are continuous with the fascia of the leg and also with the periosteum of the tibia. It could be easily demonstrated on the cadaver, if the first portion, the rectus portion, were divided, that it required but little force to extend the leg. If in addition to this the inner portions of the aponeurotic portions were divided, then the leg could be extended but with some difficulty. In fact he had on several occasions not only divided the insertion of the rectus, but had carried the incision to either side so as to leave scarcely a finger's breadth of the aponeurotic structure at these situations, and still the limbs could be extended, although with much difficulty. Not long ago he had seen a case of fracture of the patella which illustrated the importance of the outer portion of the aponeurotic structure. The patella was fractured, the inner portion of the aponeurotic structure was completely ruptured, and only about a finger's breadth of the outer portion was intact, evidently, however, overstretched, as the fragments of the patella corresponding to that portion were widely separated. Still the man could walk, and could use the limb for ordinary purposes. His only fear was that in getting down upon his knee to oil his engine (he was an engineer) he might rise incautiously and rupture the remaining structures.

It seemed to Dr. Bryant that much of the tendency to separation depended upon the degree of extension of the injury through the lateral aponeurotic structure. If this structure retained its integrity, there would be less difficulty in maintaining the fragments in apposition and overcoming retraction of the muscles on the anterior surface of the thigh. He had noticed this fact at the times when he made a free incision for the purpose of wiring the patella, a procedure of which he did not now approve, especially as a routine practice. In the cases which had come under his observation the fibrous tissue had interfered less with approximation of the fragments than had the intervening blood-clots. One case in particular was recalled in which the presence of firm clots between the fragments made any crepitus impossible.

In general Dr. Bryant concurred in what Dr. Stimson had said. He regarded it, not as a question of what the hospital surgeon could do under the most favorable circumstances, but rather what should be recommended as the best method of treating fracture of the patella by the general profession which had not such special opportunities. He would regard it as extremely mischievous to put forth the state-

ment that wiring of the patella should be resorted to as the first procedure. He had wired only twelve patellæ, and had had but one unfortunate result. It was in a case of delirium tremens. It seemed to him that every case of fracture of the patella must be treated more or less upon its own particular basis. One must consider the patient's willingness or unwillingness to submit to any operative procedure, the condition of the opposite limb, and many other facts. He appreciated the fact that one objection to the non-operative treatment was that the patient had to be confined to bed a certain time. That was a custom which he was unwilling to admit was necessary. During the last four years he has treated six cases in which for one reason or another he did not wish to confine the patient in bed, by fixation and extension limited to the limb itself, allowing the patients to go about the ward on crutches. In one case, in experimenting as to the amount of traction the patient would stand, he applied forty pounds, and no objection was made. The results in these cases were equal to those obtained in the recumbent position by non-operative methods.

As to the strength required to hold the fragments in apposition, he remembered very well that in the first case in which he employed wire he used a piece of large size, but found that almost no force whatever was required for this purpose. Since then he had used the smallest wire he could find. He made a vertical incision, and only sufficient to put in one small piece of wire quite superficially. In two or three instances he had sewn the parts together and had had no occasion to find fault with the result. Finally, he had found intervention of blood-clot interfere more with crepitus than fibrous tissue.

DR. ABBE expressed admiration for the simplicity of the operative method suggested by Dr. Fowler, and under the best surroundings it might be an ideal operation, accomplishing the best results. It did not seem to him, however, that the time had arrived when even in New York we could be absolutely sure of the non-infective character of our surgical operations in every particular. To have one infected joint with sacrifice of the limb in a series of a dozen or thirty cases of fracture of the patella would be more disastrous than the results obtained by the old method of treatment which might be attended by a slight disability of the limb. In view, then, of the fact that there was a large proportion of almost perfect functional knees following the non-operative treatment, it seemed to him that was still the safest method to endorse. Only recently he had treated two private cases by the old method with results so perfect that he

was glad not to have taken the risk of opening the joints, although some years ago, in accord with the custom, he had wired a good many fractured patellæ.

DR. FOWLER was inclined to think that in Dr. Lilienthal's case the fracture was due to direct violence, which would account for the very good result without operative treatment. Ability to elicit crepitus, which was true of this case soon after applying the Martin bandage, would be regarded by Dr. Fowler as an indication to refrain from operative interference, and to employ just such measures as were employed by Dr. Lilienthal. As to good results following non-operative treatment of fractures of the patella by indirect violence, he must confess that comparatively few had come under his observation. The length of the ligamentous union did not seem to govern the amount of the disability. It was rather the extent of the injury done the quadriceps extensor muscle, particularly the rectus femoris. Here was the explanation of the advantage of massage.

While he could not help agree with Drs. Stimson, Bryant, and Abbe, that the question had not been fully settled as to what cases of fracture called for operative treatment, and that it would be manifestly wrong for the New York Surgical Society to advocate operative interference in all cases, yet he thought the subject was in the position of abdominal surgery some years ago, and we were working towards an ideal result which we hoped to reach with the least damage done our patients between the time when our observations commenced and the moment when the millennium should be reached. While discussions of this kind could scarcely definitely settle the question, yet they all tended to bring out experience and to stimulate more active surgical thought. It was with this in view, more than with the desire to bring forward an operative procedure which might or might not in some respects be desirable, that he had brought the matter forward. It had been a source of pleasure to him, and had more than repaid him for his pains, to have listened to the experience of men who had had such large opportunity to observe fracture of the patella.

In the non-operative treatment of fracture of the patella, the apparatus spoken of by Dr. Bryant had been used by him with most flattering success so far as obtaining short ligamentous union was concerned. But in no case of indubitable ligamentous union had he succeeded in obtaining a perfect functional result as shown by the ability of the patient to stand on the affected limb and attempt to hop.

DR. LILIENTHAL mentioned some of the facts in his case which pointed clearly to fracture by indirect violence instead of direct violence. There was no contusion. As to rapid disappearance of the effusion under the bandage, he had not stated that it had entirely disappeared in half an hour, but only to the extent of permitting of a diagnosis and to feel crepitus. He did not regard massage as at all magical in its effects, and agreed with the explanation given by Dr. Stimson of its beneficial influence. It was the same, he thought, as that offered by the Dutch surgeons.

CYSTINE CALCULUS.

DR. ABBE showed a large, pure cystine calculus, weight 280 grains, removed by suprapubic operation from the bladder of a boy aged five years.

FREE ABDOMINAL DERMOID.

DR. ABBE also showed two dermoid tumors removed from one patient. One bore rare relations to the abdominal cavity, being situated high and attached only to the omentum,—not to the ovary nor to the intestine. It measured eight inches in diameter, contained bunches of hair, teeth, etc. The opposite ovary contained both mucous and dermoid cysts.

INDEX TO SURGICAL PROGRESS.

HEAD AND NECK.

I. Eighty-seven Cases of Trephining of the Apophyses of the Mastoid. By Dr. A. BROCA (Paris). These eighty-seven operations were upon eighty-two subjects, of which eighty were children. The first cases occurred in 1892, and the subsequent history of the cured patients has been secured.

Thirteen of the eighty-two patients have died; five of intercurrent disease developing some weeks after the operation (bronchopneumonia, 3; general tuberculosis, 1; tubercular meningitis, 1). In four cases (acute meningitis, 3; and cerebral abscess, 1) the condition which caused death existed before the operation. Of the seventy-two remaining cases three died, and in but one of them was it a direct result of the operation.

In order to study these cases they are best divided into the following classes:

(1) *Acute Mastoidal Abscess with Acute Otitis Media.* Thirty-seven cases; 36 subjects. Complete cure, 29; recurrence, 1; permanent fistula, 1 (tuberculous infant); recent operations with the patients still under treatment, 2; progressive necrosis which two operations did not suffice to check, death, 1; death from intercurrent complications (scarlatina, pertussis, and cholera infantum), 3; death from operation, 0.

In all of these trephinings, twelve of which were performed upon children less than a year old, pus was found in the mastoid cells; in none of them was the sinus opened nor was the facial nerve divided. The dura mater was accidentally exposed in one case, but no harm resulted. The operation done after the method of Schwarze is simple, rapid,

and easy of control ; its mortality is *nil*. For these reasons the incision of Wilde, so apt to be followed by a fistula, should be abandoned, notwithstanding some recent reports.

For the relief of the acute mastoiditis, in only six cases was it necessary to open the canal of the antrum and the tympanum.

(2) *Mastoidal Fistulas*. These fistulas are common, since he has been obliged to operate thirty-three times upon thirty-one subjects. Their previous duration was from some weeks to four years. *The great majority were a sequel to the incision of Wilde*. Of the 33 fistulas 25 are actually cured ; in 1 the result is unknown ; 1 persists ; 3 are still under treatment ; 5 are dead, 3 independent of the operation, 1 from meningitis developing as a result of the operation (the entire petrous portion was removed), 1 from cerebral troubles occurring seven months after the operation ; but 1 death, therefore, in 33 cases, and this in a very extensive diseased condition.

The operation then is safe. The apophyses, the cavity of the antrum, and the tympanum should be methodically opened and curetted free from all diseased bone. In this way the facial nerve is spared ; it was cut but three times ; although by the operation recommended by Chaput it is almost inevitably sacrificed. The post-operative course of treatment is very long, and lasts at least six months ; the results are excellent, however, and even in cases where both sides were operated upon fair hearing was preserved.

(3) *Mastoidal Abscess following Chronic Otitis*. These patients, eleven in number, are identical with those in the last class,—5 cures ; 1 recurrence where the trephining was confined to the apophysis alone ; 3 are under treatment ; 2 deaths, non-operative (chronic tuberculosis, old cerebral abscess).

(4) *Chronic Suppuration of the Labyrinth*. These suppurations should be first treated by opening the membrane (operation of Stœke), for if the process is confined to the tympanum a cure may be effected in three weeks (1 case). But one should make it a rule to carefully examine the cavity of the antrum, and it may be necessary to open all of the cavities as in a fistula. Three cases : 1 cured ; 2 under treatment.

(5) *Eburnation of the Apophysis without Suppuration of the Tympanum or of the Mastoidal Cells.* One case: 1 cure.—*French Congress of Surgery*, Session of 1894.

II. Surgery of the Maxillary Sinus, and its Progress During the Past Ten Years. By Dr. RANGÉ (Challes). Since rhinoscopy has made the antrum directly accessible through the nasal cavity the pathology of the sinus has been radically changed; not merely transformed, but enlarged to unforeseen limits; a host of rhinorrhœas, which were formerly regarded as chronic coryzas, are now traced to their true origin within the sinus. An entirely modern form of intra-maxillary abscess has been created, one which is recognized and characterized by the presence of pus in the nasal fossæ.

Although for many years the empyema of the antrum of Highmore has been recognized, the difference between the two is one of degree and not of kind, and the symptoms of the milder form may merge rapidly into those of the classical disease under the existence of certain conditions. The two names, "open empyema" and "closed empyema," are now commonly used to express the difference between the two.

Before the use of the rhinoscopic mirror the diagnosis was based upon the external symptoms alone, but now the suppurative processes within the cavity are found to be much more common than was once believed.

The modern form of maxillary abscess is much more difficult to recognize. Its diagnosis does not rest upon one symptom alone,—nasal suppuration. Unilaterality, intermittence, fetor are helps, but are untrustworthy; pus must actually be discovered within the antrum. This may be done, after the method of Heryng, by transillumination, or by catheterization of the natural outlet or exploratory puncture, lavage, or aspiration.

As the innumerable variety of operative proceedings for the relief of the old form of Highmore's empyema literally did not leave a place for a new operation, the treatment of suppuration within the

antrum has not made the progress which pathogenesis and diagnosis have. When the operator is thoroughly familiar with intranasal technique, lavage through the natural meatus is probably to be preferred. When trephining must be done the alveolus of a molar tooth is the better site. The opening through the canine fossa should be reserved to use in cases which require tamponnade and curetting.—*French Congress of Surgery*, Session of 1894.

III. Remarks upon a New Series of Operations for Goitre. By Dr. ROUX (Lausanne). Since the first series of 115 operations for goitre, which he published in 1891, Roux has operated upon 177 new patients. These figures must not lead one to believe all goitres are operated upon at Lausanne. No patient is operated upon without having been under the iodide treatment first for some months. As to the use of interstitial injections they have cured some goitres; in others they caused sclerosis, and often the shrivelled masses caused more discomfort than their size. In all cases the ultimate operation was made more difficult.

In this new series of Roux two deaths occurred; one from a brown atrophy of the heart, the other from a suppurative pneumonia.

The indications for operation were as follows: difficult respiration 142; the characteristic modification of the voice appeared in 86 cases; marked wheezing in 36 cases. Difficulty in swallowing is mentioned 49 times; cardiac troubles 54 times. Four patients were operated upon solely because they wished to improve their looks.

Roux relies upon local anæsthesia; in the rare cases where general anæsthesia was used, he regards the operation as more bloody and more liable to accidents. He used Kocher's method in 104 cases, and that of Socin in 73 cases.

The results are very satisfactory; the symptoms which demanded relief disappeared. But one case of operative myxœdema developed.

In two cases not operated on, who died suddenly, Roux does not accept the theory of Krönlein, that death is caused by a violent contraction of the sterno-thyroid and sterno-hyoid muscles frequently

hypertrophied. Roux believes that the sudden death in cases of goitre is due to a passive congestion of the tracheal mucosa and of all the muscles of the neck, caused by the combined efforts of all of the muscles of respiration.—*French Congress of Surgery*, Session of 1894.

H. P. DE FOREST (Brooklyn).

FEMALE GENITO-URINARY ORGANS.

I. Diagnostic Ureterotomy. By Dr. H. A. KELLY (Baltimore). Within the last year Dr. Kelly has performed three operations, at the completion of which he feared the ureter had been ligated, as it appeared in each instance to be enlarged.

It was impossible to ascertain certainly whether this accident had occurred without either taking out a large number of ligatures which had been placed in the ureteral area or catheterizing the ureters. In either event the danger would have been much greater to the patient than the operation about to be described. To remove all of the ligatures in the ureteral area and religate all of the bleeding vessels would have consumed too much time, and the catheterization of the ureters would have been still more impracticable.

For these reasons he determined to resort to ureterotomy as the easiest solution of his dilemma. Accordingly he located the ureter at the pelvic brim, snipped the peritoneum over its course, and made a longitudinal incision one-half centimetre in length into the lumen, through which he passed a small ureteral sound down into the bladder. In two cases of the three he found the ureters free, the enlargement being simply due to the pressure of the pelvic mass previous to the operation. In the third case, however, he found that the ureter had been included *en masse* with a large area of bleeding tissue in the pelvic floor. He at once removed the constricting ligature and was able to pass the sound into the bladder. By this simple operation much valuable time was saved, and uninterrupted recoveries in each case justified the statement that the operation is without danger.

In closing the slit in the ureter he used delicate mattress sutures in two cases. The third required four sutures on account of the persistent oozing of urine. These sutures were very lightly passed into the outer coat of the ureter, not entering its lumen.

The cases in which he resorted to this operation were myoma uteri, carcinoma uteri, and dense pelvic inflammatory disease.

All of the patients made complete recoveries, and there have been no apparent ill effects from the operation up to date. He used gauze drainage in each case, and there was not the slightest urinary odor detected at any time on the dressings.

For cases in which there is grave doubt as to whether the ureter has been ligated or cut he earnestly advises this diagnostic measure.—

Johns Hopkins Hospital Bulletin, December, 1894.

REVIEWS OF BOOKS.

THE PRINCIPLES OF SURGERY AND SURGICAL PATHOLOGY. By DR. HERMANN TILLMANN, Professor in the University of Leipsic. Translated from the Third German Edition by JOHN ROGERS, M.D., and BENJAMIN TILTON, M.D. With 441 Illustrations. New York: D. Appleton & Co., 1894.

The translators of this work undertook the task of rendering it into English because it seemed to them that there was a demand, especially among our students, for a text-book devoted to the principles of surgery and surgical pathology separate from the surgery of the special parts; for German authors divide their surgeries into general and special, including in the former, not only general surgical pathology, but also the pathology and principles of treatment of the injuries and diseases of the various tissues, and confining the special surgery to the consideration of the purely local manifestations and regional surgery.

This "general" part of Tillmanns' surgery which these gentlemen have translated is certainly from one of the best of the German surgeries. It is divided into three sections, the first of which is devoted to the general principles governing surgical operations. In this part are chapters on the preparations for an aseptic operation; the alleviation of pain during operations; the prevention of loss of blood during an operation; general rules for performing an aseptic operation and for the after-treatment of the patient; the different ways of dividing the tissues; the methods of arresting hæmorrhage, drainage of wounds, the method of uniting the tissues, general considerations of amputations, disarticulations, and resections; and operations for remedying defects in the tissues. The second section is devoted to the methods of applying surgical dressings. It contains

chapters on the antiseptic and aseptic protective dressings; other methods of treating wounds; general rules for the application of bandages and retention appliances; the sick-bed of the patient; immobilization appliances and dressings; and the application of immobilizing dressings made of materials which gradually harden. The third and last section is given to surgical pathology and therapy, and is made up of chapters on inflammations and injuries; injuries and surgical diseases of the soft parts; injuries and surgical diseases of bone; injuries and diseases of joints, and tumors.

The work is thoroughly up to date. "Asepsis," says the author, "has taken the place of antiseptics in operations." And further, "One should operate as dry as possible, and avoid irrigating and washing out the wound with bichloride solutions whenever this can be done." "Since I began to make less free use of the poisonous antiseptics, I have no longer observed this aseptic wound fever." These are sentiments directly in line with modern surgical thought.

Each subject is treated concisely, though nothing is omitted. Even the care of hypodermic needles is given some attention; and such subjects as muscular hernia, dislocations of muscles and tendons, dislocations of nerves, and progressive myositis ossificans multiplex are not omitted.

But little space is given to historic considerations. The value of the work is enhanced by the author's own original researches, especially his experiments in the histogenesis of new connective-tissue formations and in the anatomy and physiology of skin-grafting.

Tumors are briefly treated. Throughout the whole work are references to the author's *Special Surgery*.

The translators have done their work well, and, notwithstanding that we encounter "colour" and "behaviour," we are still pleased to be assured by the title-page that they live in New York.

BLOOD-SERUM THERAPY AND ANTITOXINS. By GEORGE E. KRIEGER, M.D. Chicago: E. H. Colegrove & Co., 1895.

Until the scientific study of the etiology of diseases was begun, therapeutics was based upon the vaguest sort of empiricism. It has

been to the scientific mind the most unattractive of all the departments of medicine, when, indeed, it should be the very end and object of our science. According to Rossbach, "For thousands of years mankind has experimented in this direction, and the result has been the discovery of but four remedies for three diseases." Panaceæ have come and gone.

We are now witnessing the dawn of the era of therapeutics. The new serum remedies are the outcome of scientific studies of the etiology of diseases, and differ from the old remedies in that they represent the end of a scientific sequence rather than the beginning of an empirical hypothesis.

This little work of Dr. Krieger's explains the nature and method of the new therapy. It contains chapters on the blood-serum therapy, toxins and toxalbumins, tetanus, and diphtheria. It can be read to advantage by those who would have an insight into this interesting and important subject of the day.

TRANSACTIONS OF THE AMERICAN ORTHOPÆDIC ASSOCIATION. Eighth Session, Vol. VII. Philadelphia: Published by the Association, 1895.

This volume contains a number of excellent papers both from the regular members and from the corresponding members of the Association. Judging from the quality of the articles published, this session, under the presidency of Dr. Phelps, must have been an eminent success. Of the non-residents who prepared papers for this meeting are Owen, of London; Grattan, of Cork; Kaptein, of Holland; Lorenz, of Vienna; Little, of London; and Schede, of Hamburg. The discussions tend somewhat in the direction of the popular saying of Lorenz, "Man hat in der Orthopædie viel zu wenig mit der Elasticität der Theile gerechnet." This is especially attested in Dr. Moore's paper on "The Abuse of Phelps's Operation for Club-Foot."

The volume is well gotten up and contains a number of illustrations.

LABORATORY GUIDE FOR THE BACTERIOLOGIST. By LANGDON FROTHINGHAM, M.D.V. Philadelphia: W. B. Saunders, 1895.

This little work is devoted to the technical methods, and is especially intended for convenience in laboratory work. The methods of staining, etc., are those that are found in the larger text-books, and have been collected in this manner for laboratory convenience, just as the "Microscopische Technik" of Kahlden in German. It is not nearly so full as the German work, but it is certainly a handy little book for the laboratory table.

JAMES P. WARBASSE.

CORRESPONDENCE.

THE GROSS PRIZE.

THE S. D. Gross Prize of \$1000 has been awarded to OSCAR H. ALLIS, M.D., of Philadelphia, for his essay entitled "*An Inquiry into the Difficulties Encountered in the Reduction of Dislocation of the Hip.*"

J. EWING MEARS,
Chairman, Trustees of S. D. Gross Prize Fund and Library.

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A NEW OPERATIVE METHOD IN THE TREATMENT OF FRACTURE OF THE PATELLA.¹

By GEORGE RYERSON FOWLER, M.D.,

OF BROOKLYN,

SURGEON TO THE METHODIST EPISCOPAL AND TO ST. MARY'S HOSPITALS.

PERMIT me to premise this paper by a statement to the effect that, notwithstanding surgeons have apparently grown timid when the subject of the operative treatment of fracture of the patella is brought forward for discussion, in my judgment this is the only rational course to pursue, with certain exceptions, thereafter stating my reasons for offering to the victims of this injury the radical cure rather than the employment of tentative measures, which, in the vast majority of cases, give but indifferent results.

While I am fully aware that those who oppose the operation hold a valuable weapon in the shape of certain statistics of the operative treatment, still I think that, in a measure such as this, in which so much benefit is to be derived when the case is brought to a successful termination, the surgeon's individual experience should be, to some extent, his guide in determining whether or not he shall abandon a procedure for which no adequate substitute has been offered. If his own experience prove unfavorable, it is far preferable that he attempt to improve upon present methods than to revert to ancient ones, the employment of which, save in cases so extremely exceptional that it is scarcely worth while to take them into account, is followed by but indifferent results, so far as the function of the limb is concerned.

A few years ago every fracture of the patella occurring in the practice of surgeons in the large cities was in danger of being

¹ Read before the New York Surgical Society, February 13, 1895.

wired as a primary procedure. What with suppurative conditions resulting in loss of function of the joint, consequent amputation and loss of life from sepsis, the summary of results as derived from statistics, it must be confessed, made a very bad showing for the operation. Then came the reaction; the pendulum swung as completely in the other direction, and surgeons with mechanical instincts are as busily engaged as ever in devising appliances for the non-operative treatment of fracture of the patella.

To my mind, the question as to the causes of failure of union by bone and the substitution therefor of a ligamentous connecting band in fracture of the patella is practically settled. They are the same as exist when failure of union occurs after fracture of other bones,—*i.e.*, failure of approximation of the fragments, the interposition of soft parts, and the supervention of diseased conditions of the bone itself. In transverse fracture of the patella the first of these conditions is necessarily present, and the second is absent only in those cases in which the injury is the result of direct violence from striking against some hard resisting substance, the floor of the prepatellar bursa being driven sharply against the bone and its fibrous aponeurotic structures divided by the impact.

The first injury of this kind that came under my observation was that of a woman, who, in a fit of temporary insanity, threw herself from a third-story window to the ground. She suffered a compound comminuted fracture of the patella, the fragments of which came into apposition without difficulty, the bony surfaces making firm contact. The second case was one of double fracture (both patellæ), and resulted from a fall from a height of twenty-five feet, the patient falling squarely upon both bent knees. Although the fractures were not compound, as one might expect, yet they were comminuted, and the surrounding parts were very much contused. Upon opening the joint (for this was in the early days of wiring the patella, and the indications and contraindications relating to the operative procedure were not accurately defined) the fragments were brought into apposition without the necessity of removal of intervening tissue. A third case was one

in which the injury was the result of a kick from a vicious animal. In all of these cases the joint was opened, possibly, needlessly, as I now view it, but the experience has been valuable in that it decided me, in a fourth case of the kind coming under my observation, to refrain from operative interference. The result obtained, as well as an incident in the subsequent history of the case, may warrant its introduction at this point.

On September 5, 1890, W. V., aged twenty-two years, house-painter by occupation, was precipitated by the giving way of a scaffolding upon which he was working, from beneath the eaves of a three-story storage building, equal in height to a four-story dwelling, to the ground. In the descent both knees came in contact with a projecting window-ledge, and probably while the limbs were flexed. He was seen by me within an hour of the accident. Besides other injuries he was found to have a transverse fracture of each patella. The structures upon the anterior surface of the knee-joints showed evidences of having come in contact with some hard substance; both contusions and abrasions were present. The lines of fracture, in the case of both bones, were located somewhat nearer the middle of the bone than in the classical fracture. Upon careful palpation of the parts it was discovered that the fragments were about half an inch apart, but could be brought accurately in apposition, and also that, when the fractured surfaces were applied to each other, motion was not easily obtained, and when obtained, sharp, rasping crepitus was heard and felt. The inference drawn from this state of affairs was that the fractures were the result of direct violence, and that no intervening fibrous-tissue shreds were present between the fragments to prevent bony union. It was deemed possible to obtain the latter, providing the fragments could be maintained in proper position. With this in view, a plaster-of-Paris splint, fenestrated at the anterior knee portion, was applied. The fragments were adjusted through the fenestrum of each splint and held in position by proper-sized and tightly-rolled gauze rolls secured by adhesive plaster. At the end of four weeks, union having taken place, all apparatus was discarded, and massage of the quadriceps extensor femoris of each limb instituted. This was continued for a period of three weeks longer, at the end of which time, first passive and then active movements (the limb being guarded by a posterior check apparatus) were practised. *Complete*

restoration of function and indubitable bony union in both patellæ resulted.

On October 6, 1891, just thirteen months following the first, this patient met with the following accident: While standing upon the curb-stone and reaching for the step of his wagon with his left foot he missed the step, and, in attempting to save himself from falling, he felt something give way in the left limb, which at once became useless. He was taken to his home, where I saw him shortly afterwards. The usual appearances of transverse fracture of the patella were present. The line of separation corresponded to about the middle of the bone. The fragments were separated about two fingers' width, and when brought together no real crepitus could be obtained, although the fragments were apparently brought in contact. The sliding movements of the fragments upon each other were free and unimpeded. This injury, unlike the first, was the result of muscular effort, in this instance the fibrous aponeurotic structures forming the floor of the prepatellar bursa had not parted simultaneously with the bone, but an appreciable interval of time had elapsed between the occurrences, during which the fibrous tissue became stretched beyond its limits of resiliency, finally giving way. With the occurrence of the latter the portion which had bridged over the gap in the bone, by atmospheric pressure combined with tilting of the fragments, became entangled in the shape of irregular shreddy masses upon the spiculated fractured surfaces (Macewen). The presence of these prevented the occurrence of distinct crepitus and likewise permitted the rather free movements of the fractured surfaces upon each other.

The treatment instituted was precisely the same as in the first injury, the patient, in view of the favorable termination of the latter, declining operative interference. In spite of every care in securing and maintaining, apposition of the fragments the result was such as is commonly obtained in fracture of the patella treated by non-operative methods,—namely, ligamentous union.

The assertion that the overstretched and finally ruptured patellar aponeurosis plays the same rôle here as do the interposition of the soft parts between the fragments in ununited fractures elsewhere (for a fractured patella with non-osseous union is, in reality, an ununited fracture) is borne out both by analogy and clinical experience. In upward of thirty cases in which I have

inspected the interior of knee-joints following transverse fracture of the patella, in only those instances in which the fracture occurred from direct violence was this condition absent. Any method of treatment, therefore, in which this is not taken into account, the injury having been received in the usual manner,—*i.e.*, by muscular contraction,—will result, in the vast majority of cases, in failure of bony union,—in other words, these cases will terminate as ununited fractures. The possible exceptions to this rule are instances in which the floor of the prepatellar bursa is exceptionally thin and still further attenuated by the stretching process to which it is subjected, the fractured surfaces being left sufficiently free for the medullary tissue cells, or so-called osteoblasts, to gain access and obtain support.

The third factor in preventing union of a fracture in this region—namely, diseased conditions of the bone itself—is of very rare occurrence except as it may follow attempts to apply the wire suture or some of its modifications. Here the additional injury to the bone, resulting from the drilling and the presence of and pressure from the wire, combined with increased risks of infection when this method is employed, lead to caries of the bone.

A perfect functional result is certainly greatly to be desired following fracture of the patella, as well as all injuries, and it has been the glory of modern surgery that it has been able to restore to lives of usefulness many who, in the old times, were either condemned to perish or doomed to drag out a miserable existence as cripples or invalids. To obtain such a result it is essential that the same steps be taken here as in the case of fractures of the long bones,—*i.e.*, that the fragments be brought into accurate apposition with no intervening structures to prevent them from uniting. In order to effect the removal of the shreds of fibrous tissue it will be necessary to open the joint and clear the fractured surfaces by means of the knife, heavy scissors, or the sharp spoon. This being accomplished, the problem of how to secure the fragments in their proper relation to each other is presented. The bone suture first suggested itself for this purpose as the most rational procedure, a wire of silver being employed. While

many of the cases thus operated upon have given brilliant results, yet it is equally true that some have lost the use of the knee-joint partially or entirely, others have suffered amputation of the limb, while not a few have lost their lives. Septic synovitis is responsible for the result in cases in which extensive adhesions within the joint lead to fibrous ankylosis; suppurative osteo-arthritis, all the joint structures becoming involved, the surrounding soft parts finally taking part in the destructive processes, leads to amputation, with its attending dangers; finally, the occurrence of general infection, either from one of the above sources, or from extensive suppuration in the thigh, the infection finding its way from the upper recess of the joint capsule, which, according to Riedel, is frequently ruptured in this injury, may lead to the loss of the patient's life.

Briefly and plainly speaking, therefore, either it must be acknowledged that modern surgery is incompetent to deal radically with this class of injuries, or else its methods must be revised to meet the indications in a radical manner. The struggle must be that of vital resistance against infection,—of asepsis against sepsis.

It will be generally admitted that in a recent injury the tissues which lie in the immediate neighborhood are more or less impaired in their function through circulatory disturbances and extravasations, and hence are deprived to some extent of their power of vital resistance. To open a knee-joint through such structures is to invite septic processes from the very moment these are divided. Therefore, it is a wise precaution to defer the operation until sufficient time has elapsed to permit these tissues to regain their normal condition. Clinical experience supports this theoretical view, as evidenced by the fact that operations undertaken as secondary measures are far less frequently followed by disaster than those in which the operation is resorted to as a primary procedure. A further indication for delay resides in the assertion made by Riedel that the occurrence of rupture of the capsule at its upper recess (beneath the quadriceps extensor tendon) is an occasional complication of fracture of the patella, and that opening the joint before this rupture has healed may lead to

extensive infection of the intermuscular connective-tissue planes of the thigh.

Inasmuch as the skin over the patella in most individuals is peculiarly thick and marked with deep creases that are exceedingly difficult to cleanse thoroughly, the time occupied in waiting for the disappearance of disturbances of the soft parts, extravasations, etc., can be advantageously utilized in accomplishing an aseptic condition of the region of the knee-joint by repeated cleansings, and the continuous application of some non-irritant yet efficient antiseptic.

Having established a sufficient justification for the operation, and decided upon a proper time for its performance, a word as to the technique in general may be in order.

In speaking of the operation in a general way, it may be said that it should be conducted in all its details as a strictly aseptic procedure; the cavity of the joint should be exposed, and its structures handled as little as possible; the dissection for the purpose of exposing the fragments kept within the narrowest limits; the time occupied by the operation reduced to the minimum; no foreign body should be left in the joint; the fragments should be held in approximation by means employed from without rather than passing a suture through the fragments (wiring), or around the fragments (tiring); and, lastly, the wound should be closed without drainage, and the parts kept at rest by means of plaster of Paris.

The special method which I desire to bring forward for consideration consists essentially in exposing the fragments as an intermediate procedure, *i.e.*, after the immediate effects of the injury have subsided and before the occurrence of ligamentous union, for the purpose of clearing their surfaces of intervening soft parts, and the application of fixation-hooks somewhat resembling Malgaigne's, except that a single instead of a double pair is employed.

The parts are kept at rest for from fourteen to twenty-one days, or sufficiently long to permit of the subsidence of the effects of the traumatism upon the surrounding structures, as well as the closure of a possible rupture of the upper recess of the cap-

sule of the joint as described by Riedel. During this period of waiting, the time is advantageously occupied by daily cleansings of the parts with soap and water, and the application of gauze compresses wetted with the boro-salicylic solution of Thiersch, secured in position with a figure-of-eight bandage. The latter also serves to promote coaptation of the fragments.

The operation wound by which access is gained to the fracture is placed either transversely or vertically; if the former is employed it commences at the inner edge of the patella slightly above its middle, curves sufficiently downward to include beneath the flap the line of fracture, crosses the front of the lower fragment just above the attachment of the ligamentum patellæ, and ascends to terminate at a point opposite to the place of commencement. The half-moon-shaped flap thus marked out is dissected back just far enough to expose the line of fracture and no farther. Careful and systematic removal from between the fragments of the intervening mass consisting of stretched and torn shreds of fibrous tissue and partially organized blood-clot is now practised. This is greatly facilitated by first incising along the free margin of each fractured surface and loosening the mass at these points first. The blade is now slipped between the mass and the fractured surfaces, and the former freed from the latter without difficulty, and removed as one piece. Care is taken during this portion of the operation not to tilt or otherwise disturb the fragments, and to expose the joint surfaces as little as possible. No irrigating fluid should be employed; whatever portions of the *débris*, blood-clot, etc., which may chance to fall into the gap between the fragments, and cannot be picked out by the dressing forceps, may be removed with bits of sterilized gauze grasped between the blades of hæmostatic forceps.

The fragments are now made to approximate each other as much as possible. One of the fixation-hooks is thrust into the bone at the site of the attachment of the ligamentum patellæ to the lower fragment. The other is pushed through the skin and into the bone at the site of the attachment of the rectus femoris to its upper border. With the fractured surfaces in perfect coaptation, as seen with the flap still turned back, the shanks

of the fixation-hooks are drawn together and secured, and the fragments held in a most secure manner. Two or three very fine silk sutures may be employed to secure the edges of the soft parts along the line of fracture. The flap is now replaced and sutured with a continuous subcuticular silk suture. Sterile gauze dressings and non-absorbent cotton, secured in position by rollers, are applied; a plaster-of-Paris splint insures immobilization. If the cover of the transverse incision is properly managed the lower hook will be so placed as to secure the bone directly in the line of the incision, thus avoiding the passage of the former through a wound of its own in the skin. If the vertical incision is employed, both upper and lower hooks can be secured in the bone in the line of the incision. The transverse incision (**U**-shaped) gives better access to the parts, if well curved.

The fixation-hooks are permitted to remain for about three weeks. Should it become necessary for any reason to remove them earlier, this can be done by opening the splint at the anterior knee portion. The patient may recline, or sit, or go about in a wheel-chair during the convalescence.

The advantages claimed for this method are as follows:

(1) The parts to be operated upon are in better condition, both as regards vital resistance and asepsis than when the primary operation is done.

(2) There is the minimal exposure of the joint surfaces and disturbance of the fragments.

(3) The operation can be done in a remarkably short space of time, hence less risk is taken both as to sepsis and the anæsthetic.

(4) No foreign suture material is left in the bone to produce caries, or to demand subsequent reopening of the wound and removal.

(5) The hooks may be removed, and if the union is not found to be complete or firm, they may be reapplied.

Although I have carried out the details of the operation as above described, with the exception that I have applied the silver wire suture instead of the fixation-hooks in a sufficient number

of cases, to demonstrate the advantages of waiting until the tissues have regained their normal conditions before interfering, as compared with primary operations, but one case has come under my care since I devised the complete method conjoined with the use of the hooks. In this case the patient, a young female, received her injuries while descending the stairs in one of the large shopping emporiums in this city. She was taken at first to one of the metropolitan hospitals, and subsequently removed to her home in Brooklyn in a carriage. The operation was done on the twentieth day after the injury. The hooks being removed, the union was found to be perfect, and the very slightest amount of irritation conceivable had followed their presence.

Further, I would say that the employment of special fixation-hooks of the pattern used by myself is not necessary. Any of the single modifications of Malgaigne's hooks will answer. I selected this particular pattern for the reason that, by elevating the shanks, ample room was obtained for closing the wound, and for the application of dressings, which could not be readily accomplished by the ordinary Malgaigne's hooks. Finally, in cases in which the fragments come together easily the hooks may be dispensed with entirely, providing all tissue intervening between the fragments have been removed, coaptation being secured by any of the efficient methods employed in the non-operative treatment of transverse fracture of the patella.

WOUNDS OF THE BLADDER IN OPERATIONS FOR HERNIA.¹

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IN 1769 Verdier published his treatise on hernia of the urinary bladder, and so thoroughly and scientifically was his work performed that it still remains one of the classics of this subject, no later writer having been able to discover any cases occurring up to his time which Verdier had overlooked. From that date to the present this variety of hernia has been considered a rarity, and hence of little practical interest, but within the last few years numerous cases in which the bladder has been wounded during the operation for radical cure of hernia have been recorded, and I have been able to find thirty-four cases in the literature and to add to them eight unpublished cases which have occurred in New York. The reason for the great increase in the frequency of this accident is undoubtedly to be sought in the altered methods of operating for hernia. In the old operation of herniotomy, consisting of a simple *débridement* or incision of the hernial ring, the bladder was not exposed to injury even if it were prolapsed, and was not likely to be discovered unless it were injured or were very conspicuous. But the attempt to effect a radical cure, now made even in cases operated upon primarily because they are strangulated, necessitates complete dissection of the neck of the sac at least in order to ligate it, and if the hernia is in close relation with the bladder, the latter is more likely to be discovered even if not wounded.

¹ Read before the New York Surgical Society, February 27, 1895.

It may at first seem strange that such a thick-walled, fleshy organ, with its evident muscular structure, could be injured unwittingly even by the careless, but as a matter of fact the protruding portion of the bladder is generally so attenuated and altered that its recognition has sometimes been a matter of difficulty even after it has been opened and the surgeon has passed his finger into it. It is, moreover, frequently enveloped in a mass of fat which completely conceals its true nature. There is, therefore, small blame to be attached to those surgeons who have injured it in the past, although the few who have recognized it in time to avoid injury are certainly deserving of praise. But while this is true of the past, it is probable that in the future the accident will be less frequent, now that the subject has been more thoroughly studied, and the surgeon has been put upon his guard and warned of signs of danger which will enable him to make his diagnosis in time.

The most important of recent contributions to the subject have been those of Aue, Lejars, and Ostermayer, very little having been written upon this accident in English, except the reporting of some clinical cases. The case which first aroused my interest in this subject was the following:

CASE I.—On August 16, 1893, there was admitted to St. Luke's Hospital a tall, thin, Irish working-man, aged sixty-two years, with very soft and flabby muscles, suffering from an oblique inguinal and small femoral hernia of the right side. Five years previously, while lifting a heavy iron rail, he felt something give way in his right groin, and four or five weeks later a lump appeared at this spot. He never wore a truss, but nine months ago was operated upon in one of the hospitals of this city for radical cure. Within two months the hernia returned, and for five months after its reappearance he wore a truss, but the latter was so inefficient and caused so much discomfort that for two months he had been unable to wear it, and he begged to have something done for his relief. The inguinal hernia was reducible, not of large size, but with a very large canal, and the small femoral hernia was also reducible. A scar remained from the former operation, but it was impossible to say what method had been employed in that case. The patient gave no unusual symptoms; above all, nothing to attract attention to the bladder, and the urine was normal.

August 22, under ether anæsthesia, I undertook the operation for radical cure. The incision was made on the inner side of the old scar, parallel with Poupart's ligament, exposing the sac of the inguinal hernia, and then another incision was made passing downward from the middle of the first, so as to expose the femoral sac. The latter was dissected out, freed up beyond its neck, folded up according to Macewen's method, and secured within the ring by a stitch passing above Poupart's ligament. The femoral ring was closed with three buried purse-string sutures of silkworm gut, as is my custom, each one covering in the preceding. The inguinal sac was then dissected out with some difficulty as it was adherent to the scar, incised, and the ring and canal were found widely open. The sac was empty. When its neck had been reached and was being separated from the margins of the internal ring, I noticed what seemed to be a second sac, projecting to the inner side of the first when the patient strained during some disturbance in the anæsthesia. This structure was drawn out and examined carefully, the possibility of bladder presenting in this way being in my mind at the time. The sac was pale in color, almost white, as thin as an ordinary hernial sac—in fact much thinner than many, and evidently contained fluid. It was not intraperitoneal, and feeling inside of the abdomen I did not detect any pedicle leading to the bladder. I was still suspicious, but imagined that it must be the old hernial sac, perhaps shut off from the peritoneal cavity at the first operation, and converted into a hydrocele of the sac. The opening in the peritoneal cavity was carefully protected with gauze, and an incision about an inch in length was made in the sac, which gave issue to a clear yellow fluid which was recognized as urine.

Even when the sac was open it was almost impossible to recognize either muscular tissue or mucous membrane, so thinned out and altered were the tissues of the organ, but an instrument passed into its cavity clearly entered the bladder and touched another introduced by the urethra, and without passing through any narrow neck as if the sac was formed of a diverticulum. The wound in the bladder, which would readily admit the finger, was closed at once with three tiers of fine silk sutures, not including the mucous membrane, and placed very close together. After a thorough cleansing the inguinal sac was stripped up with some difficulty from the bladder (although it was not so adherent to it as I had supposed would be the case) and sutured close to its neck with a continuous catgut suture, a ligature

seeming inadvisable because of the proximity of the bladder. The conjoined tendon was then stitched with buried silkworm-gut sutures to Poupart's ligament, leaving the cord in the lower angle of the canal as in Macewen's method. A strip of gauze was inserted into the angle near the cord, and another at the lower end of the femoral branch of the skin incision, the skin and fascia were united, and the usual sterilized gauze dressings applied.

The patient suffered considerable pain for three days until his bowels moved, and the temperature reached 101° F. on the first day after the operation, then running for a week from 99° to 100° F., but the wound healed by primary union except at the angles where the small gauze drains lay. There was no discharge except a little serum, and the drains were removed in a week. No sinus formed, and the wound was completely healed by September 11. The patient was directed to empty the bladder every two hours for a day or two after the operation (and a catheter had to be employed perhaps a couple of times), but he had no bladder symptoms. He was discharged with a perfectly solid scar on October 2, but unfortunately I have been unable to follow him since.

I am indebted to Drs. Robert F. Weir, William T. Bull, Lewis A. Stimson, Frank Hartley, Arpad G. Gerster, and Lucius P. Hotchkiss, all of this city, for the following unpublished cases:

CASE II.—F. P., blacksmith; German; married; aged fifty-three years, admitted to New York Hospital December 2, 1891. For fifteen years he had had on the right side, and for one year on the left, reducible inguinal herniæ, for which he wore a truss. He never complained of any urinary symptoms. The patient was very fat and flabby. The right hernia was tympanitic; the left dull on percussion. The right inguinal canal admitted three fingers; that of the left side was smaller.

December 7, Dr. Weir operated for radical cure upon both sides. That upon the right was easily dealt with. On the left the incision was five inches in length. The aponeurosis of the external oblique was incised, opening up the inguinal canal freely to the internal ring. A small sac was found, dissected out, and then transfixed at the neck and ligated with catgut. A small mass of extraperitoneal fat presenting in the wound was ligated and cut away. A similar elongated fatty mass was treated in the same manner, but it became evident in

cutting this off that a cavity had been opened and some urine escaped. The ligature was removed, and exploration with the finger introduced into the cavity showed that the bladder had been wounded. A continuous catgut suture was applied to the mucous membrane, and a tier of interrupted fine silk sutures introduced like Lembert's sutures outside of this. Three "Macewen" sutures were applied to the posterior wall of the inguinal canal, its lower angle being drained with a strip of gauze, the fascia being united over the cord above. A catheter was introduced into the bladder and kept in place for three days.

The wound was dressed on the second day, and there was a slight odor of urine, and on the following day the skin was decidedly reddened by that secretion. A sinus formed, but on January 1 the urinary odor had disappeared, although the sinus did not close until three or four weeks later. The patient ran a high temperature for two or three days, 103° F. at the highest, but no abscesses formed, and the wound healed without serious complications.

CASE III.—A banker, forty-five years of age, had had a left scrotal epiplocele which had been irreducible for several months, and had been treated by a truss, but the latter had caused discomfort. In 1893 Dr. Bull operated for a radical cure. The abdominal walls were very thick. In separating the spermatic cord from its enveloping layers it was noticed that the subperitoneal fat was also unusually abundant. The sac contained omentum and was reduced by slight pressure before the incision was made. What appeared to be the sac of a direct hernia was dissected out, ligated, and cut away, considerable fluid (urine) appearing, but the latter was thought to have been due to the irritation of the sac by the pressure of the truss. Before ligating the sac, the finger had been passed into it, and appeared to enter the peritoneal cavity. In the subsequent preparation of the inguinal canal for suture, the true hernial sac was found protruding through the internal ring, having been previously overlooked by reason of the great thickness of the abdominal walls and subperitoneal fat. This sac was treated as usual and the canal closed according to Bassini's method, the external wound being sutured without a drain. After the operation was concluded, it was considered probable that the first sac had been the urinary bladder, and this was soon proved to be the case by frequent micturition, tenesmus, and hæmaturia, so the following day the wound was partially opened opposite the external ring, and a gauze drain inserted. The wound healed, however, by first intention in two and a half weeks, with no leakage of urine,

and with only trifling constitutional disturbance. At the end of one year there was no relapse.

CASE IV.—A man, seventy years old, with an immense, irreducible, left inguinal hernia, was operated upon by Dr. Stimson, September 20, 1894. The sac contained the greatly hypertrophied sigmoid flexure, which could not be reduced on account of its size, so it was resected, and sutured. In dissecting the parts the bladder was very slightly nicked, although its presence had already been noticed. Some urine escaped. The minute opening was closed by a single suture. The patient died in forty-eight hours, from causes dependent upon the major operation, without reference to the wound in the bladder.

CASE V.—A man, about forty years of age, with an old oblique inguinal strangulated hernia of the left side, was operated upon by Dr. Hartley in 1890. The sac contained small intestine and omentum, which was easily reduced at the operation, and it was proposed to perform a "radical cure." The bladder was recognized and separated from the sac, being known by its thickness and position. It lay extraperitoneally. The sac was ligated and cut away, and the bladder must have been injured at this time from being imperfectly held out of the way, but exactly how the accident occurred is unknown, the wound not being recognized at the time. The bladder was probably included in the ligature of the sac and cut or torn during the removal of the latter. The wound was closed, but on the occurrence of hæmaturia, two hours later, it was reopened, clots were found in the extraperitoneal space near the bladder, and an extraperitoneal wound in the latter was found and sutured. The patient died of shock and loss of blood.

CASE VI.¹—Nathan S., seventy-six years of age, with a very large strangulated left inguinal hernia, was operated upon in private by Dr. Gerster, March 16, 1893. After reduction of the hernia and extirpation of the sac, a yellow, lipomatous but fluctuating tumor was observed closely attached to the spermatic cord, with a pedicle running into the abdominal cavity. It was incised, in the conviction that it was a præperitoneal lipoma, a cavity opened, urine escaped, and exploration with the finger proved that it was the bladder. The wound in the bladder was closed with three tiers of catgut sutures, and the organ reduced. The ring was not closed, but drained, the

¹ Cases VI, VII, and VIII were reported in the discussion of the New York Surgical Society.

external wound being partly closed by sutures. An uninterrupted recovery was made, and the patient now wears a truss. An attempt at permanent catheter-drainage was made, but the patient would not keep the instrument in place.

CASE VII.—Joseph P., forty-seven years of age, was operated upon by Dr. Gerster at Mt. Sinai Hospital, November 14, 1893, for a strangulated left inguinal hernia of large size. The bladder was recognized, but during the "radical" part of the operation, in dissecting away a mass of fat closely adherent to the sac, the organ was wounded, and urine escaped. The wound was immediately closed by suture as in the last case, and the hernial sac extirpated. The inguinal canal was also left open in this case. November 16, there was high fever, delirium, and abdominal pain. November 18, urine escaped from the wound, and all the symptoms improved. Permanent catheterism was successfully employed in this case. The leakage of urine continued until the middle of December, and on January 19 the patient was discharged with a truss.

CASE VIII.—A man, fifty-four years of age, with a reducible left inguinal hernia, was operated upon, January 24, 1895, at Bellevue Hospital, by Dr. Hotchkiss for a radical cure. The sac was dissected out, ligated, and removed. What appeared to be a mass of loose adipose tissue was ligated and cut away, but it became evident in doing so that a cavity had been opened, although the extreme thinness of the walls and the serous appearance of the lining made the surgeon think he had only accidentally discovered a second hernial sac, or, perhaps, a diverticulum of the first, so the wound was closed, the canal being dealt with according to Bassini's method. Twenty-four hours later, it being evident that the bladder had been injured, the wound was reopened and enlarged upward, revealing an opening of considerable size in the extraperitoneal part of the bladder, and a large amount of blood-clot in its neighborhood, the ligature having evidently slipped. The vesical wound was closed by sutures, but the patient died of shock and loss of blood in nine hours, having passed no urine.

Anatomy.—The bladder may be involved in hernia in at least three different ways. First and most common is the prolapse of a portion of the organ which is entirely extraperitoneal, thirty-four (two-thirds) of my fifty-one cases being of this variety, but in three of them the protrusion took place through small abnor-

mal openings in the abdominal wall just internal to the external ring, and not through the inguinal or femoral canals. I have included these three cases, however, with the rest, because their other characteristics are so similar that it is usually impossible to distinguish them clinically, especially as there may be an inguinal hernia associated with them and closely adherent. It is important to distinguish between those cases in which the bladder alone is present (Fig. 1), and those in which there is also a hernial sac containing bowel or omentum (Fig. 2). The latter

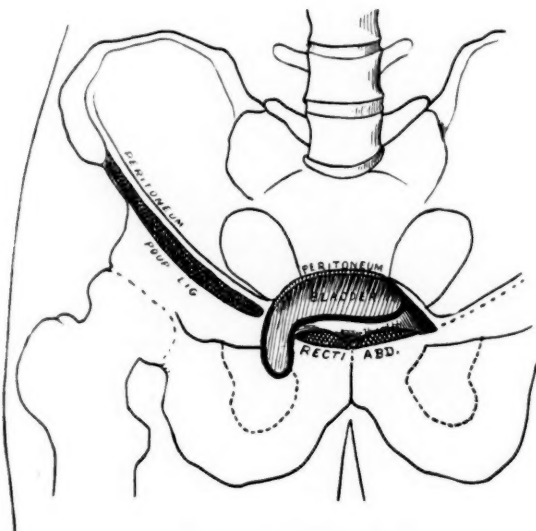


FIG. 1.—Hernia of extraperitoneal portion of bladder.

are perhaps most likely to come to operation, but the risk of accidental wounds is much greater in the former, as the operator will find only one sac and be more likely to open it at once, supposing it to be the hernial sac. Of the thirty-four extraperitoneal cases, about two-thirds (twenty-three cases) were complicated with other herniæ.

Rarest of all is the true intraperitoneal form (Fig. 3), only four such cases being found. This appears least likely to be injured, as all of these cases were recognized in time and reduced without accident. The third variety (Fig. 4), of which I have

only thirteen cases, is, nevertheless, very important, owing to the great danger of wounds being inflicted upon the bladder, even when it has been previously recognized, should it present in this way. In this form both the extra- and intraperitoneal portions of the bladder are involved, the intraperitoneal portion forming actually a part of the wall of an accompanying hernial sac, usually lying posteriorly. The double danger of the condition lies in the likelihood, on the one hand, that the surgeon will reduce the contents of the sac, dissect out the latter, and ligate and cut

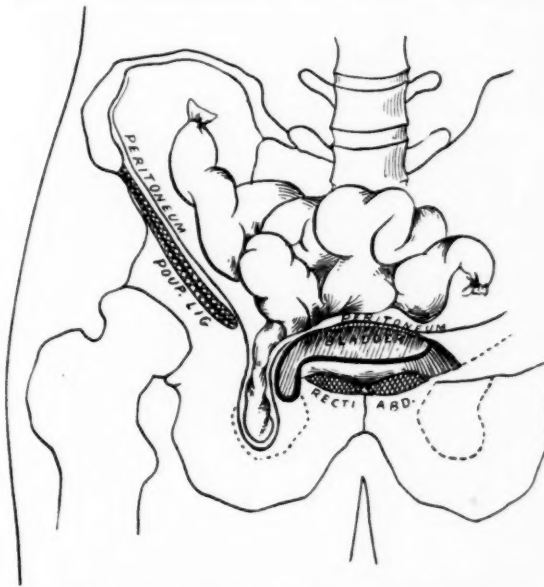


FIG. 2.—Hernia of extraperitoneal portion of bladder associated with hernia of bowel.

it away, including a portion of the bladder, without recognizing the organ, or that, on the other, he will injure it even after having recognized it in trying to separate it from the sac before ligation of the latter.

The diagrams illustrate the different varieties of vesical hernia. In them the bones of the pelvis are represented in outline, and it is supposed that the abdominal walls have been entirely cut away along the crest of the ilium, Poupart's ligaments, and the pubis, the section also laying open the inguinal canal.

The anterior part of the hernial sac has been cut away so as to expose its contents, and the bladder has been laid open by an incision entirely removing part of the fundus, as well as the anterior part of the wall of the prolapsed portion as if it had been cut off after dilating the organ and freezing it. Where the section passes through the extraperitoneal portion of the organ, its cut edge is represented by a solid line, and where it invades the intraperitoneal part, the cut edge is drawn with a striated line. The cut edge of the peritoneum can easily be traced in all the

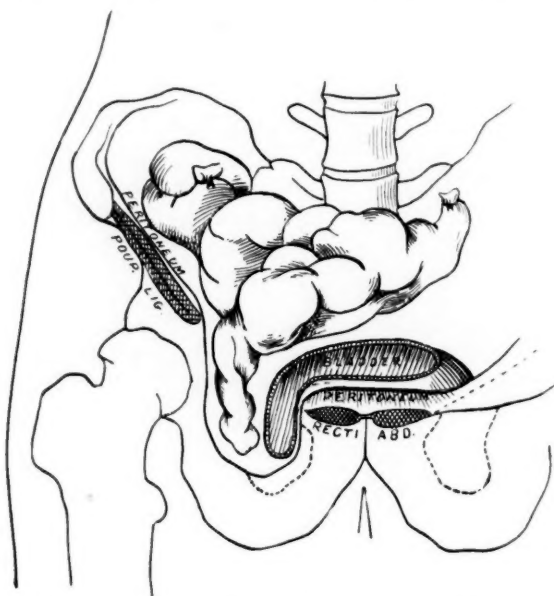


FIG. 3.—Hernia of intraperitoneal portion of bladder.

figures along the abdominal parietes, across the fundus of the bladder, and down into the hernial sac.

It has generally been supposed that the bladder is very rarely present in femoral hernia, but if we take into consideration the proportions of inguinal and femoral hernia (according to Macready, there are 92 per cent. inguinal to 8 per cent. femoral) the contrary will be seen to be the case, for of the fifty-five cases in my collection, ten, or nearly one-fifth, are of the femoral variety, against forty-five inguinal, proving that femoral hernia

involves the bladder in a larger proportion of cases than inguinal. There is, however, one element which requires notice—namely, the fact that as the proportion of femoral herniæ coming to operation for strangulation is much larger than that of inguinal (in 100 cases of operations for strangulated hernia, 42 per cent. were inguinal, and 58 per cent. were femoral, according to Macready), and as fully one-half of my cases were strangulated, it is to be expected that a larger number would be of the femoral variety than is usually the case.

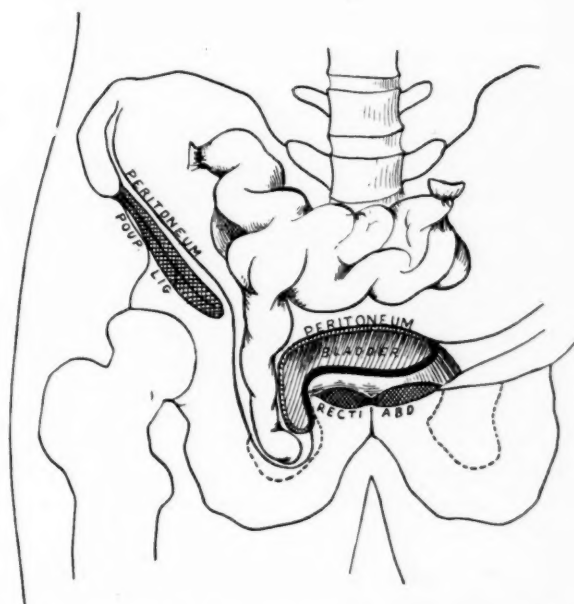


FIG. 4.—Hernia of both intra- and extraperitoneal portions of bladder.

Except to note that the bladder occasionally protrudes in perineal and ventral herniæ, and that there is one rare instance on record in which it was found in a sacro-sciatic hernia, we need not consider the other varieties which are foreign to our subject.

As will be shown later, the walls of the protruded part are much altered. The protrusion is often spoken of as a diverticulum, but as a rule it consists merely of a very much elongated

portion of the bladder, seldom with any narrowing of the neck, and it is probably always made by the traction of the hernia, and does not consist in a true diverticulum, which was originally free and has become engaged in a hernia. Pott's famous case, in which he found a stone in an extraperitoneal protrusion of the bladder in the groin, with a very narrow neck, was of eight years' duration, and the narrowing was undoubtedly due to late changes. Pilz and Lane found similar diverticula, but in Pilz's case it was covered in part at least with peritoneum.

Etiology.—As to the causes which lead to the formation of hernia of the bladder but little is known, except those general facts which apply to all forms of hernia. The proportion of the sexes is slightly different from the ordinary figures, being as follows in my cases: inguinal, thirty-seven males to six females; femoral, five of each sex, showing an increased proportion of women, and also of femoral hernia. Vesical hernia appears to be a peculiarity of advanced years, and, perhaps, we should add of old herniæ, for of forty-five cases in which the age is known, nearly one-third were over sixty years, and two-thirds were over fifty at the time of operation. But Krönlein's case occurred in a boy of five years, and in Pott's case, operated upon at thirteen years of age, the hernia had also been first noticed at the age of five.

The most generally favored theory for explaining the descent of the bladder ascribes it to the traction exerted by some mass of extraperitoneal fat, designated by the French by a special name, "lipocèle,"—the well-known theory advanced by Cloquet and Roser, to go no further back. It is certainly true that such lipocèles have been found in many of the recorded cases attached to the bladder (according to Lejars in eleven cases out of eighteen in which the description is complete enough to allow of drawing deductions), and the fatty tumor has often been the cause of the accidents to the bladder. In many cases, however, it seems probable that that organ has been drawn out of the abdomen by the peritoneum of the hernial sac, just as the cæcum or sigmoid flexure is often pulled down. One other factor which deserves attention is the frequent occurrence of the bladder in her-

niæ which have relapsed after attempts at radical cure, as was the case with my patient, causing me to notice their relation; and I was interested afterwards to find that Lanz was inclined to explain his case in the same way. In the operations for radical cure it is customary to pull the sac well down when ligating it in order to secure a smooth internal surface for the peritoneal cavity, and this traction not only brings the risk of including the bladder in the ligature, but would certainly predispose it to descend if that part of the peritoneum were further drawn upon to make a sac for the recurrent hernia.

The intraperitoneal variety of vesical hernia can be explained by the ordinary causes of hernia, provided the organ be dilated and flabby. Habitual constipation would predispose to the protrusion, for a rectum distended with fæces would lift the bladder out of the pelvis just as Petersen's rectal bag employed in the operation of suprapubic cystotomy elevates it, and by thus bringing it to the level of the hernial apertures would render its prolapse more likely to occur.

Diagnosis.—Important as it is to be able to recognize the bladder before the operation, the diagnosis will rarely be made so early. Occasionally, however, the surgeon may be fortunate enough to find symptoms which will awaken a suspicion on his part—such as vague difficulties in urination, passing attacks of retention, often accompanied by painful vesical tenesmus, these attacks being relieved in some cases by assuming some peculiar position, as by lying down, or hanging by the knees over the end of a bed, and in others by pressure upon the swelling in the groin or scrotum, the patient having discovered in these cases that the tumor increases in size when retention sets in. Occasionally he may learn that urination sometimes takes place in two acts, the bladder first emptying itself, and the hernial pouch somewhat later. The urine may show signs of vesical inflammation, or may remain perfectly healthy. If strangulation occurs, it may be marked by less intense intestinal symptoms, resembling those of strangulation of a Littré hernia, or it may be accompanied by decided uræmic signs and vesical tenesmus. But ordinarily there will be no difference from the usual typical clinical picture of strangulated hernia of intestine or omentum.

The physical examination itself will rarely give a clue to the condition, although in a few cases it may do so by the evident fluid contents of the tumor, its rapid disappearance when the patient lies down (like the flow of serum from an otherwise empty hernial sac associated with ascites), the inability of a truss to prevent descent of the hernia, and the causation of a desire to urinate or even of an immediate and uncontrollable evacuation of the bladder by pressure upon the sac. Palpation after the reduction of the greater part of the hernia may reveal a small, flat, doughy tumor feeling like a thickened sac or like a flattened piece of adherent omentum, and whenever this is felt the presence of a hernia of the bladder should be suspected, and every means of exploration employed to settle the diagnosis. The means of exploration are naturally the introduction of a large curved sound (Mercier's prostatic catheter has a long beak which is particularly suited for this purpose), trying to bring its point up to the neck of the sac, or to make it enter that cavity, or the injection of considerable quantities of fluid or air into the bladder while watching the effect upon the tumor. A negative result of this examination does not disprove the existence of a vesical hernia, for the opening between the prolapsed part of the bladder and its main cavity may be entirely closed by external pressure, or by inflammatory thickening of its walls and obstruction of its lumen.

Often the diagnosis will first be made during the operation, and it is worth while to emphasize the points which will aid to it before the bladder has been injured. One of the most constant indications is an unusual quantity or quality of the fat surrounding the hernia—the lipocèle already alluded to. Sometimes a bulky mass of fat is found, a true lipoma, sometimes only a thick layer of subperitoneal fat. The fat will often attract attention by its having apparently a thin membranous covering or sac of its own, but when this thin cellular envelope is opened it will be found to be attached by septa to the fat, so that the latter does not shell out as readily as the ordinary hernial sac, and, moreover, in working down through the fat the surgeon will come down upon the bladder and find the fat closely adherent to it. This peculiar

double attachment of the fat to both of these apparent sacs should especially put the surgeon on his guard, warning him that in the first place he is not merely enucleating adherent omentum from a very thin sac, and in the second place when he reaches the bladder that he has not found an ordinary sac, which he can readily strip out of the extraperitoneal fat.

The appearance of the bladder itself is very deceptive, for although its muscular fibres will sometimes be well marked and easily recognized, in the majority of cases the wall is so attenuated that the muscle forms a thin coating resembling the cremaster, and it may even be totally unrecognizable as muscle. In my own case and in many others recorded, the wall of the bladder was so thin and transparent that it resembled an ordinary hernial sac, and it was only by the odor of the urine that it could be recognized even after it had been opened; in fact, in many cases it has been ligated and cut away, and the diagnosis has not been made, even after examination of the resected portion. Reverdin was compelled to have the tissue removed, examined microscopically in order to satisfy his doubts in one case, so closely did it resemble the peritoneum of a hernial sac. If the prolapsed bladder forms part of the sac wall of an ordinary hernia (as in the combined extra- and intraperitoneal form of protrusion) it may be overlooked, being considered merely a thickened patch in the wall of the sac. To show the real difficulty of recognizing the bladder, one needs only to glance at the following list of structures for which it has been taken. In fifty-seven cases collected by me the bladder has been recognized in twenty-three cases before injury, in four it was not seen until it was wounded, in two it was not seen at all during the operation, in ten cases it was taken for the hernial sac, in four for a second hernial sac, in five for a tumor or cyst, in three for a thickened patch in the sac wall, in three for properitoneal fat, in one for degenerated omentum, and in one for a haustrum of the colon.

When the bladder has been recognized before it is injured (and it has generally been recognized thus by surgeons who have already once seen the organ wounded), the suspicions of the sur-

geon have been usually awakened by the peculiarities of the fatty deposits already described, or by the muscular fibres, or, finally, by the relation of the spermatic cord which, instead of lying behind or being spread out over the surface of the tumor, as in the ordinary hernial sac, lay in front of it. These suspicions have been confirmed by tracing the pedicle into the abdominal cavity (and there should be no hesitation in enlarging the wound for this purpose), and finding it to lead downward behind the pubic bone, or by injecting fluid into the bladder and finding that it filled the prolapsed portion, or by introducing a sound into the urethra, and feeling it in the sac, or at least approaching its pedicle in the pelvis.

Even when the bladder has been opened, it is not always easy to demonstrate the fact, although the appearance of the urine has generally done so. In other cases the proof of the accident has been obtained by passing a sound, or by making injections into the bladder by the urethra. When the injury has not been recognized at the time of operation it has generally shown itself later by the formation of a urinary fistula in the wound, sometimes as late as the tenth day, by vesical tenesmus and hæmaturia, or, in a few cases, by the development of peritonitis. Occasionally the subsequent examination of the tissue removed has been the proof of the nature of the injury.

Wounds.—The injuries inflicted upon the bladder have been very various in character and extent. In some cases the bladder has been incised, generally in an exploratory and cautious manner, something unusual in its appearance having put the surgeon partially on his guard. In others it has been boldly cut away after ligation. In a considerable number of cases it has been torn by the finger in trying to separate the hernial sac from it. In two cases the wounds have been needle punctures. In a case of this kind reported by Roth, a patient who had been operated upon for the radical cure of hernia died from other causes a few days after the operation, and it was found at the autopsy that the sutures placed in the inguinal canal had included the wall of the bladder, but had not penetrated its entire thickness. Probably there would have been no evil consequences to this accident.

Keetley¹ reports that in a similar operation he had accidentally wounded the bladder with the point of his needle, but had discovered it at once, and, closing it with sutures, had obtained primary union. Halsted² operated for the cure of a large reducible inguinal hernia in a man, forty-eight years of age, by his method on August 16, 1889, and ten days later urine escaped by the wound. In nine days the flow ceased and the sinus closed, the patient recovering. As Halsted sutures the sac before cutting it away, instead of applying a ligature, it seems probable that the bladder must have been wounded (as he suggests himself) in passing the sutures intended to close the inguinal canal. The size of the wound has varied from these needle punctures up to an opening which would admit two fingers.

Treatment.—When the bladder has been recognized before it has been injured it should, of course, be freed and reduced, the ring being closed as usual by sutures. But in some cases it will be found difficult to dissect the bladder from the surrounding parts, and in such cases it is wise to abstain from any attempt at radical cure, and to leave the pouch *in situ*, especially as the subjects are apt to be old and are often in poor condition, owing to the existing strangulation of the hernia. If a distinct diverticulum is found, however, it is probably best to resect it, closing the opening in the bladder with sutures, rather than to return such a long pouch into the abdomen, but it must be remembered that true diverticula are uncommon, although the prolapsed portion often resembles them when first discovered. As a rule, it regains its elasticity when dissected free. I have found seventeen cases recognized and treated without injury, three of which terminated fatally, and in one case the result is not recorded (Walther). Death, however, was never due to the bladder complication. In eight cases (and probably others in which this point is not mentioned in the reports) the hernial opening was closed by sutures. In two or three cases no attempt was made to reduce the prolapsed bladder or effect a radical cure. All of the purely intraperitoneal cases belonged to this category, with one death and one unknown result.

¹ Lancet, 1894, 1, 1068.

² Johns Hopkins Hospital Bulletin, 1890, 1, p. 13.

When the bladder has been wounded, there is a choice of three methods of treatment, the open method, ligature, and suture. The open method leads inevitably to the formation of a fistula, and should only be employed where there is a great danger of infection from such accidental complications as sloughing of the hernia or very foul urine. Of eight cases in my table, death followed the operation in three, being due in one case to a pre-existing pyelonephritis, and in another to some intestinal cause, not to the injury to the bladder.

The ligature has been applied and left *in situ* in eleven cases, of which three died, all who recovered having a sinus, except Bull's case. In two cases (and, perhaps, Hartley's case should also be included) the ligature slipped off, necessitating a secondary operation which terminated fatally in one case (and also in Hartley's). The fatal case was that of Hotchkiss, related elsewhere. Jungengel saved his patient, operating forty-eight hours after the primary operation, and closing the bladder wound with sutures. In another case (Michel) the surgeon reopened the wound in twenty-four hours, removed the ligature, and sutured the vesical opening, the patient making a good recovery. These results are not so bad but that if suture be impossible (from lack of material, necessity for hurry, or any other pressing reason) the ligature might be considered as a means of occluding the wound in the bladder in case of emergency, for if it can be made to hold by transfixion, its use will tide the patient over the early dangers of extravasation, provided the external wound be treated openly by packing, or, at least drained by a large tube carried down to the neighborhood of the vesical wound.

But, unquestionably, a suture should be made if it is in any way possible. Whether silk or fine catgut is employed seems to be a matter of indifference, but the sutures should not penetrate the mucous membrane; they should be placed very close together, ten or twelve to the inch, and there should be at least two layers, and by preference three. The method which gave such excellent results in my own case appears to be the best, the stitches of the first tier passing through everything but the mucous membrane and holding the divided muscular layer firmly together. The

second tier of sutures were passed like Lembert's sutures of the intestine, turning in the first set slightly, and a third set, not so closely placed but passed in the same way, rolled in and brought into contact still broader surfaces. This method has done me good service in suturing the bladder after suprapubic section. Before attempting to close the wound in the bladder all sloughing, lacerated, or crushed tissues must be cut away so that the edges of the wound shall be of sound material. The danger of making the sutures penetrate the entire thickness of the wall lies in the liability to the formation of calculi, which has been observed to take place upon the knots of thread or even of catgut when exposed in the bladder or dropping into it. If desired, a test of the tightness of the closure can be made by injecting the organ.

The external wound must be drained in some way, and, usually, this can be done by carrying a plug of gauze down to the wound in the bladder. If a radical cure is attempted, it would seem to be wiser in such cases to insert the sutures closing the inguinal canal according to Macewen's rather than according to Bassini's method, for the latter closes everything up to the level of the internal ring, so that in case of any real necessity for drainage on account of leaking of urine, the fluid would have to find its way out by a long and tortuous route. In Macewen's method the cord lies close to the pubis and a small drain could be carried through the opening left for the cord without interfering with the radical cure, and yet it would act promptly and efficiently in case of accident.

It is doubtful whether permanent catheter drainage of the bladder assists at all in securing primary union of the vesical wound, and as it adds an element of danger it would perhaps be better not to employ it. Of the cases in my table there were fifteen recoveries after primary suture, and one case which lived long enough to secure primary union of the vesical wound, besides two recoveries after secondary suture, making a total of eighteen cases. Permanent catheterization was employed in ten cases, including both secondary operations, and a sinus formed in four of them, one being a secondary operation. In eight cases

the bladder was not drained and a sinus formed in two of these, showing rather better results than when a catheter was left in the bladder. Of course the figures are not large, but I think we can conclude from them that it is safe to dispense with drainage of the bladder, and merely direct the patient to urinate every two hours for two or three days after the operation, and if retention should occur, the catheter should be passed at the same intervals.

From the figures just given it will be seen that primary union of the vesical wound was obtained in twelve out of eighteen cases, or two-thirds of the cases treated by suture, not including Keetley's successful case of needle puncture. When sinuses form, they usually close spontaneously, but I have been unable to demonstrate any marked difference between the fistulae which result from open treatment, from the use of the ligature, or from suture of the opening in the bladder. Plater's case (from the sixteenth century) resulted in a permanent opening. Purcell closed the sinus in his patient by a plastic operation two months after the primary operation. All the rest closed spontaneously. In thirteen cases in which the duration of the sinus is known, two ran for four months, three for two months, four for one month, one for two weeks, and three from five to "a few" days.

Mortality.—Of the cases treated by primary suture, twenty in all (not including Keetley's case) four died (two from causes not connected with the bladder wound), and in one case the result is not known. Of the four cases treated by secondary suture, two succumbed to hæmorrhage and shock, the others recovered. The mortality of the entire series of forty-one cases in which the bladder was injured (including Keetley's and Halsted's cases) was about 25 per cent. (eleven cases), and appears to have no relation to the method of treatment. In only eight cases at the most can it be said that the vesical wound was even indirectly the cause of death. This is the more apparent when it is recalled that there were three deaths among the seventeen cases in which the bladder was exposed and not injured. The high mortality in both is undoubtedly due to the advanced

age of the patients, and to the frequency with which the hernia was strangulated, and also to the fact that many of the operations antedate the introduction of modern surgical methods.

Jaboulay and Villard¹ report three inguinal and one femoral hernia of the bladder, one of the former containing the entire organ and the prostate as well, which were reduced without injury. The bladder was wounded in the other cases, two being sutured, one of which died. In the third case a ligature was applied and left *in situ*, the wound healing without a sinus, as in Bull's case.

¹ Lyon Médicale, 1895, LXXVIII, p. 239, 281.

TABLE I.—WOUNDS OF THE BLADDER IN OPERATIONS FOR HERNIA.

No.	PATIENT.		HERNIA.			Bladder Wound Recognized.	Bladder mistaken for	TREATMENT.			Catheter & drainage.	RESULT.		Time and Cause of Death.	Size of Visceral Wound.
	Operator and Date of Operation.	Sex & Age.	Re-gion.	Variety.	Condi-tion.	Other Hern. Complicat.		Bladder Wound.	Hernial Opening.	External Wound.		Bladder.	Duration of Sinus.		
1	Plater. ¹ 1575 (?)	M. Adult.	Ing.	. . . .	. . .	Intest. & omentum.	During operation.	Tumor.	Open.	Open.	No.	Sinus.	20 y'rs.	R.	. . .
2	Mertru. ²	M. . . .	"	. . . .	Stran.	Intestine.	During operation.	Recognized.	"	"	"	"	"	D.	Next day.
3	Guyon. ³ 1750.	M. Adult.	"	. . . .	. . .	. . . .	During operation.	Abscess or cyst.	"	"	Yes.	Sinus.	50 days.	R.	. . .
4	Pott. ⁴ 1770.	M. 13 yrs.	"	Extraperitoneal.	Irred.	No other sac.	During operation.	Tumor.	"	"	No.	"	14 days.	"	. . .
5	Hedrich. ⁵ 1890.	M. 56	Ing. R.	Extraperitoneal.	"	Empty sac.	During operation.	Cystic pouch.	Open (drain).	"	"	"	Until death.	D.	3 weeks.
6	Tilling. ⁶ 1890.	M. 47	Fem. R.	Extraperitoneal.	Stran.	No other sac.	Next day.	Hernial sac.	Open.	"	Next day.	"	2 mos.	R.	Intest'l.
7	Pilz. ⁷ 1891.	M. 62	Ing. R.	Extraperitoneal.	"	No other sac.	During operation.	Fat.	"	"	"	"	"	D.	31 h'rs anuria.
8	Purcell. ⁸ 1892.	M. 56	Ing. R.	Extra- and intraperitoneal?	"	Intestine.	During operation.	. . . . .	"	"	Yes.	Sinus.	2 mos. closed by op.	R.	. . .
9	Roux. ⁹ 1853.	M. 61	Ing. R.	Extraperitoneal.	"	"	When wounded In 7 days.	Degenerated omentum.	Ligature.	"	"	"	"	D.	16 h'rs anuria.
10	Israel. ¹⁰ 1882.	M. 51	Ing. R.	. . . . .	. . .	Intest. & omentum.	In 7 days.	Not seen.	"	"	No.	Sinus.	2 mos.	R.	. . .
11	Guelliot. ¹¹ 1889.	M. 60	Ing. L.	Extraperitoneal.	Irred.	Empty sac (?)	In 10 days.	Hernial sac.	Sutured.	Sutured (drain).	In 10 days.	Sinus.	4 w'ks.	"	. . .
12	(?) ¹² 1889.	F. 28	Fem. R.	Extraperitoneal.	Stran.	Omentum.	After operation.	"	"	"	Late.	Sinus.	A few days.	"	. . .
13	Reverdin. ¹³ 1890.	F. 42	Ing. L.	Extraperitoneal.	Irred.	Empty sac.	In 7 days.	"	Open.	Sutured (drain).	Yes.	Sinus.	4 w'ks.	"	. . .
14	Hartley. ¹⁴ 1890.	M. 40	Ing. L.	Extraperitoneal.	Stran.	Intest. & omentum.	During operation.	Recognized.	Ligat. in 2 hours.	Sutured.	"	"	"	D.	Shock & hæm'ge.
15	Ostermayer. ¹⁵ 1892.	M. 60	Ing. R.	Extraperitoneal.	"	Intestine.	After operation.	Fat.	Sutured.	Sutured (drain).	No.	"	"	"	31 h'rs anuria.
16	Jungel. ¹⁶ 1892.	M. 34	Ing. R.	Extraperitoneal.	Not stran.	No other sac.	After operation. 48 hours.	Not recognized.	Ligat. slipped; in 48 h. suture.	"	Yes.	Sinus.	Some w'ks.	R.	Admitted 2 fingers.

17	Bull. ¹⁷ 1893.	M.	45	Ing. L.	Extraperitoneal.	Irrad.	Omentum.	After operation.	Hernial sac.	Ligature.	Sutured.	Sutured, drained.	No.	Prim. union.	R.	1 inch long.
18	Michels. ¹⁸ 1894.	M.	48	Ing. R.	Extraperitoneal.	Red.	No other sac.	After operation, 24 h'rs.	"	Ligat. in 24 h. sutured 2 tiers.	Open.	Open.	Yes.	Prim. union.	"	"
19	Macready. ¹⁹	F.	67	Fem. R.	Extra- and intraperitoneal (?)	Stran.	Intestine.	In 9 days.	"	Ligature.	Sutured.	Sutured.	In 9 days.	Sinus.	"	"
20	Hotchkiss. ²⁰ 1895.	M.	54	Ing. L.	Extraperitoneal.	Red.	Omentum.	In 24 hours.	A second hernial sac.	Ligat. slipped; in 24 h. sutured.	Sutured.	Sutured.	No.	Sinus.	D.	9 hours after-second op. Shock & hem.
21	Berger. ²¹ 1882.	M.	66	Ing. R.	Extra- and intraperitoneal.	"	"	In 7 days.	A second hernial sac, then intestine.	Suture, silk, 4 interrupted, 2 purse-string.	Sutured.	Sutured.	"	Sinus in 7 d.	R.	Over 3 1/2 m.
22	L. Championnière. ²² 1887.	M.	43	Ing. L.	Extraperitoneal.	Stran.	Empty sac.	During operation.	Not seen until wounded.	Sut. catgut, 2 tiers.	Open.	Sutured, drained.	"	Prim. union.	"	Closed by 8 sut's.
23	L. Championnière. ²³ 1887.	M.	44	Ing. L.	Extraperitoneal.	Irrad.	Empty sac.	During operation.	Not seen until wounded.	Sut., catgut, 3 tiers.	"	Sutured, drained.	"	Sinus in 13 days.	"	Closed by 11 sut's.
24	Böckel. ²⁴ 1887.	M.	69	Ing. L.	Extra- and intraperitoneal.	"	Intestine.	During operation.	Thickening in sac-wall.	Suture.	Sutured.	Sutured.	Yes.	Sinus.	D.	48 h'rs anuria.
25	Socin. ²⁵ 1889.	M.	50	Ing. L.	Extra- and intraperitoneal?	Stran.	"	During operation.	A second hernial sac.	Suture, catgut, 3 tiers.	Open.	Sutured, drained.	No.	Prim. union.	R.	1 cm.
26	Thiari. ²⁶ 1890.	M.	55	Ing. R.	Extraperitoneal.	Irrad.	"	During operation.	Thickening in sac-wall.	Suture, catgut, 2 tiers.	Sutured.	Sutured, drained.	Yes.	Prim. union.	"	Admitted 1 finger.
27	Polaillon. ²⁷ 1890.	M.	50	Ing. R.	"	"	Empty sac.	During operation.	Hernial sac.	Suture.	"	Sutured.	"	Sinus.	D.	A few h shock.
28	Güterbock. ²⁸ 1891.	F.	32	Fem. R.	Extraperitoneal.	Irrad.	Omentum.	During operation.	Intestinal diverticulum.	Sut., silk, 4 interrupted.	Open.	Sutured, drained.	Yes.	Prim. union.	"	Over 1 cm.

TABLE I.—WOUNDS OF THE BLADDER IN OPERATIONS FOR HERNIA.—Continued.

No.	Operator and Date of Operation.	PATIENT.		HERNIA.			Bladder Wound Recognized.	Bladder mistaken for	TREATMENT.			Catheter & <i>de marte</i> .	RESULT.		Time and Cause of Death.	Size of Vesical Wound
		Age.	Sex.	Re- gion.	Variety.	Condi- tion.			Bladder- Wound.	Hernial Opening.	External Wound.		Blad- der.	Dura- tion of Sinus.		
29	Postempski. ²⁹ 1891.	.	.	Ing.	.	.	During operation.	.	Suture.	.	.	.	.	.	.	.
30	Weir. ³⁰ 1891.	53	M.	Ing. L.	Extraperi- toneal.	Red.	Intest. & omentum	Fat.	Sut., cat- gut to m. m.; silk outside.	Sutured. "Mac- ewen."	Sutured, drained.	Yes.	Sinus.	4 w'ks.	.	Admit- ted 1 finger.
31	Lejars. ³¹ 1891.	39	F.	Ing. R.	Extra- and intraperi- toneal.	Stran.	Fallopian tube.	Thickening in sac-wall.	Sut., cat- gut to m. m.; silk outside;	Sutured?	Sutured, drained.	"	"	4½ mos.	.	Admit- ted 1 finger.
32	Justo. ³² 1892.	51	M.	Ing. R.	Extraperi- toneal.	Red.	Empty sac.	Tumor (injec- tion failed).	Sut., silk	.	Sutured, drained.	No.	Prim. union.	.	.	8-9 m.m.
33	Roth. ³³ 1892.	57	M.	Vent. near R. ext.	Extraperi- toneal.	Stran.	Empty inguinal sac.	Not seen until wounded.	"Lem- bert silk sutures.	Open.	Open.	Yes.	Prim. union.	.	.	3 cm.
34	Lanz. ³⁴ 1892.	60	F.	ring. Fem. R.	Extra- and intraperi- toneal.	"	Intestine.	Suspected.	Contin. silk sut. through all lay'rs.	Sutured.	Sutured, drained.	No.	Prim. union.	.	.	Admit- ted 1 finger.
35	Mandry. ³⁵ 1893.	72	M.	Ing. L.	Extra- and intraperi- toneal?	"	"	A second her- nial sac.	Suture, 3 tiers, cat- ters, con- tinuous.	Open.	Sutured, drained.	Yes.	Prim. union.	.	.	2 cm.
36	Rose. ³⁶ 1893.	24	F.	Ing. L.	Extraperi- toneal.	Red.	Omentum.	Hernial sac.	Suture, 2 tiers, cat- ters, gut.	Sutured.	Sutured, drained.	"	Prim. union.	.	.	Small.
37	Gerster. ³⁷ 1893.	76	M.	Ing. L.	Extraperi- toneal.	Stran.	Intestine.	Fat.	Suture, 3 tiers, cat- ters, gut.	Open.	Sutured, drained.	No.	Prim. union.	.	.	Admit- ted 1 finger.

38	Gerster. ³⁸ 1893.	M.	47	Ing. L.	Extraperi- toneal.	Stran.	Intestine.	During operation.	Recognized.	Suture, 3 tiers, cat- gut.	Open.	Sutured, drained.	Yes.	Sinus.	4 w'ks.	R	Small.
39	Curtis. ³⁹ 1893.	M.	62	Ing. R.	Extra- and intrapari- toneal.	Red.	Intest. & omentum.	During operation.	A second her- nial sac (hy- drocele).	Sut., silk, 3 tiers.	Sutured, "Mac- ewen."	Sutured, drained.	No.	Prim. union.	.	"	Admit- ted I finger.
40	Stimson. ⁴⁰ 1894.	M.	70	Ing. L.	Extraperi- toneal.	Irred.	Sigmoid flexure.	During operation.	Not seen until wounded.	Suture, 1 stitch.	Sutured.	Sutured, drained.	"	.	.	D.	48 h'rs. Not fr'm bladder- wound.
41	Lane. ⁴¹ 1894.	M.	51	Ing. L.	Extraperi- toneal.	"	Intest. & omentum.	During operation.	Recognized.	Sut'd, 2 tiers after resect'n.	"	(?)	Admit- ted I finger.

Also the two cases of Kectley and Halsted related in the text.

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- 30 ANNALS OF SURGERY, 1895, Vol. xxi, p. 634.
- 31 Lejars, Rev. de Chir., 1893, January and February.
- 32 Rev. Soc. med. Argent. (Centralblatt für Chirurgie, 1892, 798).
- 33 Roth, Deutsche medicinische Wochenschrift, 1892, p. 535.
- 34 Lanz, Berliner klinische Wochenschrift, 1892, p. 741.
- 35 Mandry, Beiträge zur klinische Chirurgie, 1893, x, 777.
- 36 Rose, Lancet, 1894, II, 194.
- 37 ANNALS OF SURGERY, 1895, Vol. xxi, p. 636.
- 38 Ibid., p. 637.
- 39 Ibid., p. 632.
- 40 Ibid., p. 636.
- 41 Lane, Lancet, 1894, I, 1186.

TABLE II.—BLADDER REDUCED WITHOUT INJURY.

No.	Reference.	Operator and Date of Operation.	PATIENT.		HERNIA.			Complicating Hernia.	Bladder Recognized.	Means of Diagnosis.	Recovered or Died.	Remarks.
			Sex.	Age. Years.	Region.	Variety.	Condition.					
1	Maurain, Verdier, Mém. Acad. roy. de Chir., II, p. 19.	Renard. 1769.	M.	80	Ing. L.	.....	Stran.	Intestine.	Before operation.	Symptoms.	D.	
2	Scott, Med. and Surg. Rep., Philadelphia, July 25, 1868.	Scott. 1868.	F.	Adult.	Ing. R.	Intraperito'l.	"	No other sac.	During operation.	Sound in bladder.	R.	
3	Krönlein, Arch. für klin. Chir., XIX, 420.	Krönlein. 1876.	M.	40	Ing.	"	"	Intestine.	During operation.	Injection. Muscle.	D.	From chloroform given 48 hours after operation for intestinal puncture. Lung complication.
4	Monod and Delagenière, Rev. de Chir., Sept., 1889, p. 701.	Monod & Delagenière. 1889.	M.	53	Ing. L.	Extraperito'l.	Irred.	No other sac.	During operation.	Pedicle led to bladder.	"	
5	Böckel, Gaz. méd. de Strasbourg, 1890 No. 2 (cited by Mandy).	Böckel. 1889.	M.	55	"	Extra- & intraperitoneal.	"	Intestine.	During operation.	Injection. Muscle.	R.	
6	Bourbon, Thèse de Paris (cited by Lejars and Mandy).	Walther. 1892.	M.	59	Ing. R.	Intraperito'l.	Stran.	"	During operation.	Pedicle. Sound.	"	
7	Bourbon, Thèse de Paris (cited by Lejars and Mandy).	Walther. 1892.	...	...	Ing.	"	"	...	During operation.	...	...
8	Kümmer, Rev. méd. de la Suisse rom., 1892, No. 4, p. 235.	Kümmer. 1892.	M.	5	Ing. R.	Extra- & intraperitoneal.	Red.	Omentum.	During operation.	Pedicle. Sound.	R.	Previous "radical" operation.
9	Roth, Deutsche medicinische Wochenschrift, 1892, 537.	Von Bergmann. 1892.	M.	48	Ventr'l near R. ext. ring.	Extraperito'l	Irred.	No other sac.	During operation.	Sound.	"	
10	Roth, Deutsche medicinische Wochenschrift, 1892, 537.	Roth. 1892.	F.	52	Ing. L.	Extraperito'l?	"	"	Before operation.	"	"	
11	Lanz, Berliner klin. Wochenschrift, 1892, 742.	Lanz. 1892.	F.	48	Fem. R.	Extra- & intraperitoneal.	Red.	Empty sac.	During operation.	Pedicle. Sound.	"	Previous "radical" operation.
12	Ostermayer, Deutsche Zeitschr. für Chirurgie, XXXIX, 137.	Ostermayer. 1893.	M.	32	Ventr'l near R. ext. ring.	Extraperito'l.	"	No other sac.	During operation.	Sound.	"	Previous "radical" operation.

TABLE II.—BLADDER REDUCED WITHOUT INJURY.—Concluded.

No.	Reference.	Operator and Date of Operation.	PATIENT.		HERNIA.			Complicating Hernia.	Bladder Recognized.	Means of Diagnosis.	Recovered or Died.	Remarks.
			Sex.	Age, Years.	Region.	Variety.	Condition.					
13	Ostermayer, Deutsche Zeitschr. für Chirurgie, xxxix, 137.	Ostermayer, 1893.	F.	43	Ing. R.	Extraperito'l.	Red.	Intestine and omentum.	During operation.	Pedicle.	R.	
14	Schoonen, Rev. de Chir., 1893, p. 331.	Schoonen, 1893.	M.	Adult.	Fem. R.	"	Stran.	No other sac.	During operation.	Pedicle.	"	
15	Reverdin, Rev. méd. de la Suisse rom., August 20, 1894, p. 470.	Reverdin, 1893.	M.	60	Ing. R.	Extra- & intraperitoneal.	"	Intestine.	During operation.	Muscle.	"	
16	Arch. prov. de Chir., October, 1894 (cited by Ann. mal. org. gen. urin., January, 1895).	Delagènière, 1893.	M.	54	"	Extra- & intraperitoneal.	"	"	Before operation.	Symptoms.	"	
17	Reymond, Bull. Soc. Anat. de Paris, November, December, 1894, p. 842.	Reymond, 1894.	F.	38	Ing. L.	Extra- & intraperitoneal?	Irrad.	Intestine, ovary, and tube.	During operation.	Pedicle.	"	

A REPORT OF THIRTY-FIVE CASES OF AMPUTATION
OF OMENTUM IN HERNIA OPERATIONS.¹

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ON December 15, 1887, I read a paper before the New York Academy of Medicine, entitled "The Conservative Treatment of Irreducible and Incarcerated Hernia," in which I reported fifteen cases, the most of which number had been reduced without operation.

In consideration of the mortality attending the operative treatment of these cases at that time, and from the fact that recurrence of the hernia was the rule instead of the exception, a plea was entered for the conservative treatment of these cases; nor do I feel that the grounds taken then were entirely wrong for *that date*, but since then advances have been made that change in the most radical manner the point from which we must view the subject, and to-day I must state emphatically that I look upon the teachings of that paper as obsolete.

In evidence of my changed opinions, I present for the consideration of the Surgical Section of the Academy this evening a report of thirty-five cases of removal of omentum, representing thirty-eight operations; three of the patients having had omentum removed from both sides simultaneously.

In this series of consecutive cases operated upon since 1889 there has not been a single death, nor has there been a case that has given me any concern as regards the life of the patient; this,

¹ Read before the Surgical Section of the New York Academy of Medicine, March 11, 1895.

in view of the accidents which formerly attended these operations seems sufficient excuse for placing them on record and for speaking somewhat in detail of the methods used.

The case histories will be published where they will be within reach of all who wish to study them in detail, and their reading will not be inflicted upon you further than they have already been in the presentation of the cases and specimens.

The following is a brief analysis of the cases : Of the thirty-five cases, nine were females, two of whom had inguinal and seven femoral hernia. Of the twenty-six males, twenty-four had inguinal, one had femoral, and one had ventral hernia. Three had omentum removed from both sides. Nine of the total number had incarceration with more or less inflammation of the omentum, at the time of its removal.

It is considered desirable that this discussion should deal principally with the removal of omentum, and with this object in view no other cases have been introduced.

It appears to the speaker that there is nothing more important in the whole field of the surgical treatment of hernia, excepting possibly intestinal repair, than the methods that should be carried out in cases of removal of omentum.

For twenty years protruding omentum has been my worst enemy in the mechanical treatment of hernia, and I am convinced that to it has been due a large number of recurrences after attempts to cure by surgical operation. It is heavy, it is slippery, it is deceptive.

Personal experience proves to me that any operation that does not open up the canal fully to the internal ring must fail to afford permanent relief, in many instances, because of the frequency of adhesions at the internal ring, or even within the abdomen.

Several such cases will be found in my case histories.

In some of these the hernia had been supposed to be perfectly reducible before the operation. In one where I had earlier done a "Barker," its failure was found to have been due to adherent omentum higher up than that method reached.

The method named has been entirely abandoned for this

reason, and, on the last twenty cases, the canal has been opened to the internal ring in every instance.

The operation has been lately performed about as follows :

The canal is opened up to the internal ring, the hernial sac freed from the adhesions, and then opened freely. If adhesions of omentum are low down in the sac, but none at its neck, no attempt to free them is made, but as much omentum as will come down by gentle traction is brought out. If adhesions exist at the internal ring or within the abdomen, these are broken up and normal omentum brought down. At times it has been found necessary to extend the abdominal incision above the internal ring in order to accomplish this. The omentum is now spread out upon a sterilized towel and unfolded until it is in a single layer, where every vessel of size can be seen. I now begin at one edge of this fan-shaped piece as near the abdomen as it can be separated into a single layer, and place a row of ligatures across to a corresponding point on the opposite edge.

No piece of fat larger than a lead-pencil is included within one ligature, and every vessel that can be seen is tied without including any fatty tissue. All ligatures are cut close to the knot, except the ones at either edge, which are clamped with forceps to control the stump.

The omentum is then cut away and the proximal edge carefully examined. As every portion has been included within one of the ligatures, bleeding points are not usually found.

Aristol is now dusted upon the fresh surfaces, the ligatures at the edges cut, and the stump allowed to drop back into the abdomen. As high as twenty ligatures have been used on a single case.

I am well aware that many surgeons consider such care entirely unnecessary, and continue the old method of tying off the entire mass with one or two ligatures, but I am also aware of the fact that to just such work is attributable the accidents which have and *have not* been recorded. There are other reasons for preferring numerous independent ligatures. If tied in small quantities, the tissue can be cut closer to the ligature. The tying need not be so tight as to endanger cutting the coats of the vessels.

Again, when the stump is reduced, it is free to spread out within the abdominal cavity in a natural manner, instead of being held in a solid or plug-like mass, which may aid subsequently in the recurrence of the hernia. It also avoids the possibility of including with the ligatures a portion of the intestine, an accident that has happened to a number of eminent surgeons. There also appears to be less liability to inflammation, as I have not seen this in a single instance, while others speak of it as of frequent occurrence.

I wish to call attention to the importance of freeing all adhesions within the abdomen in the vicinity of the internal ring. Treves has shown the frequency of intestinal obstruction due to a loop of bowel slipping through attached pieces of omentum, and one such case has come within my observation.

In my earlier cases I was caused some anxiety by the fact that nearly all of them were troubled by peculiar abdominal pains when they first got out of bed. This was not accompanied by elevation of temperature or sensitiveness at any particular spot. I finally concluded that the freshly-cut stump formed adhesions while the patient was recumbent that were pulled upon when he was in an upright position. I then began using aristol to form a film over the cut surface. At about the same time, however, I changed my method in regard to cathartics. Formerly I had left the bowels to move naturally, which sometimes they would not do for four or five days, but I changed to the use of a saline cathartic twenty-four hours after the operation. To which of the changes credit is due I cannot say, but certain it is I have had no more trouble with abdominal pains when the patient gets on his feet.

For ligatures I have used nothing but silk, beginning with No. 10 and changing to No. 8, which I now use. The larger size is used as less liable to cut the delicate coats of the vessels. It is needless to say that I use every precaution to insure its asepsis. Incidentally it will be of interest to know what methods have been resorted to for a permanent cure and the result.

Up to November, 1893, eight of the inguinal hernias had been operated upon by the method of "Barker," of London. Of

these, three have recurred. The remaining twenty inguinal operations were completed by the "Bassini" method, using kangaroo tendon for sutures back of the cord and silkworm gut for closing the aponeurosis of the external oblique, both buried under primary union where possible to obtain it. None of the last-named cases have recurred up to this time. I have had very little trouble with the buried silkworm-gut sutures. In two cases only have they caused any trouble, and then it has been very slight in character,—that is, they have come to the surface in the form of a small pimple, and have been easily removed.

Of the seven femoral hernias operated upon, not one has recurred. The method is one that I have used since 1886 with great satisfaction. The sac is stripped from its adhesions, ligated with silk high up on its neck and cut off. The ends of the ligatures are left long. The stump is reduced well within the femoral ring. One end of the ligature is passed up through Poupart's ligament, and the other one into the fascia immediately beneath. This is tied down after two or three other silk sutures have been passed in a similar manner through Poupart's ligament above and the pubic portion of the fascia lata below. If the wound closes without suppuration, no subsequent trouble with the silk has been experienced, and the only failures that I have had have been when primary union has not been obtained, following operations for strangulated hernia.

A careful review of the cases presented leads me to the following conclusions:

(1) All irreducible hernias should be operated upon unless contra-indicated by age or condition of the patient.

(2) All omentum found outside the abdomen, or that will protrude under gentle traction, should be removed.

(3) Multiple, independent ligatures of good-sized silk, which surround the vessels alone, or small pieces of fatty tissue, are believed to be safer than other methods.

(4) The use of some film-forming substance, as aristol, on the stump is believed to protect in a measure from subsequent adhesions.

CASE I.—F. J. K., aged twenty-seven years. September 10, 1889. First came to me on December 7, 1888, with right congenital scrotal hernia existing twelve years. Its cause was unknown, and he had never worn a truss. Nor had he ever had symptoms of strangulated hernia. In size the tumor corresponded in bulk to four fingers, extending down into the scrotum to the bottom, in front of the testicle. In a recumbent position a portion returns to the abdomen, but another part, believed to be omentum, appears adherent to the sac outside the external ring. This part can be forcibly returned to the canal, but does not reduce to the abdominal cavity. Attempts were made to retain the entire mass in the canal by truss-pressure, but were a failure. While he felt more comfortable with truss on, as retention was partial, this adherent omentum was always in the scrotum, and after nearly one year truss-wearing he had decided to have an operation.

Operation at the patient's home, assisted by Dr. A. C. Griffin. The incision was made to the external ring, the sac opened, and a mass of omentum as large as one's hand amputated after the breaking up of firm adhesions. Six or eight silk ligatures were used in tying off the omentum. Considerable difficulty was then experienced in separating the sac from the cord, but its neck was finally tied with No. 10 silk, and the stump reduced to the internal ring, the canal being closed by the Barker method with four heavy silk sutures. The skin was closed by silk. The fundus of the sac was left *in situ*, and a rubber drainage-tube put into it through the bottom of the scrotum. Recovery by primary union, and the patient went out at the end of third week. Three months later one silk stitch came to the surface. Cure was complete and permanent to January, 1895.

CASE II.—W. P. S., electrotyper, aged thirty years. October 1, 1889. This patient was first sent to me by Dr. William Hailes, Jr., of Albany, on February 19, 1887, and I found him with a swelling larger than a goose-egg in the right side of the scrotum, which was not reducible. He had had hernia for ten years, originally caused by lifting. Had never attempted to wear a truss until recently, and was found to have on a "Chase" truss with a water-pad which he was wearing, so that it made pressure over the neck of the tumor. He is a tenor singer in a church choir, and finds that when singing the bowel is forced down by the side of the omentum, which is adherent, and he then not only loses his voice, but finds himself in severe pain. Several attempts were made during the two years in which he was

under my observation, previous to the operation, to secure a truss that would protect him against these occasional protrusions of bowel, but without any amount of success, and he finally decided to have an operation for relief. He had never had acute symptoms of strangulation.

Operation at the Post-Graduate Hospital, assisted by house-staff. The incision was from the external ring down. The sac was opened and a large mass of adherent omentum removed after being ligated by numerous silk ligatures. The neck of the sac was cut off and its stump reduced as high into the canal as possible, and the canal closed after the Barker method with heavy silk. The fundus of the sac was left in the scrotum. Silk was used throughout the operation.

Primary union was obtained only in part of the wound, and two deep stitches were lost. He returned to his home at the end of the fourth week, but was much troubled by abdominal pains of an obscure nature for two weeks longer.

One year later he came to me, and I thought that I saw evidence of a possible recurrence, and put a truss on him. This he wore for perhaps a year, but when examined during 1894 he was found perfectly sound, and had worn no support for some time.

CASE III.—M. S., aged twenty-four years. December 5, 1889. On March 15, 1889, this patient was sent to me by Dr. L. D. Bulkley, and I found him with a right scrotal tumor as large as a goose-egg, which had existed for five years, and was not wholly reducible. It was thought that reduction could be accomplished, and he was put to bed with this object in view. On the second day in bed the first attempt was made and proved an entire failure. On the third day the tumor appeared smaller, but nothing decided. On the fourth, after about twenty minutes' work and with considerable pain, the tumor was reduced. The breaking of bands of adhesion were distinctly felt, and thickening in the upper part of the canal indicated that the mass was still adherent at the internal ring. Compress and bandage applied and absolute quiet enjoined. On the following day a truss was applied and the man allowed to go about. For about three months he got along very nicely, but then the hernia became very troublesome, and notwithstanding the fact that very strong trusses were applied it could not be retained, and he finally consented to an operation.

Operation at the Post-Graduate Hospital, assisted by house-staff. The sac, which proved of the congenital variety, was opened from the

external ring down to the scrotum, and it was found that the omentum was firmly adherent about its neck. The omentum was tied off with about ten strong silk ligatures and its stump dropped back into the abdomen. The neck of the sac could not be separated from the cord at the external ring, but was stitched through and through to close it off. The canal was then closed according to the method of Barker, with three heavy silk sutures in its anterior wall. Skin closed by silk and sealed with iodoform collodion. He made a prompt recovery, and left the hospital on the twenty-first day in good condition. He wore a bandage for two months, and as there was considerable bulging a truss was applied. Inside of one year his hernia was coming down under his truss and giving him considerable trouble. He would not consent to another operation.

This case illustrates the importance of opening the canal to the internal ring in every instance, as now done, and cleaning it of every foreign substance. Doubtless there was omentum adherent to upper part of canal that was not seen, and this acted as a wedge for redilation.

CASE IV.—J. E. R., aged thirty-seven years. February 27, 1890. First seen on February 13, 1890, at the request of Dr. C. R. P. Fisher. Has left scrotal hernia larger than one fist of three years' duration. Has never worn support of any kind. When recumbent a small part of the tumor could be returned to the abdomen, but the greater bulk of the mass seemed firmly adherent, and when attempts at reduction were persisted in the patient became sick, and all efforts in that direction were abandoned. An operation was advised and consented to.

Operation at the Post-Graduate Hospital, assisted by Dr. Sweet and staff. Incision down to external ring and sac opened. The omentum was found very firmly adherent at many places, and the sac was of the congenital variety. About fifteen silk ligatures were applied to the omentum in its amputation. The sac was ligated and cut off as high as possible through the external ring, the fundus being left in the scrotum. Canal closed by the Barker method, with four heavy silk sutures and skin by silk, sealed with iodoform collodion. Drainage from fundus of sac through bottom of scrotum by a rubber tube.

Temperature was normal on following day, and a rapid recovery was made without event. Drainage-tube removed on fourth day, and perfect primary union was found when the bandages were taken off on the tenth day. He left the hospital on the twentieth day, and was

driven rapidly to a down-town ferry over rough pavements, and then rode in the cars twenty-five miles to his home, where he arrived in a thoroughly used-up condition. From this he apparently recovered in two or three days, and kept on improving until one week later, when he developed sharp pain in the upper part of the left lumbar region. This pain was severe, but relieved by hot applications, and not accompanied by any great elevation of temperature (100° F. highest). In fact, his temperature was frequently subnormal, his bowels free, and his pulse normal. No hardening, but considerable tenderness over seat of pain.

Dr. Fisher informs me that he had attacks of this character previous to the operation. After three days the doctor wrote me, however, that he had been much improved since he had a movement containing considerable mucus and streaked with blood, and expresses the belief that the trouble was due to slight invagination. Whatever this may have been caused by, after that date the man recovered without further trouble. Some months later a small pimple formed and broke in line of cicatrix, and after discharging for some time Dr. Fisher removed one of the silk sutures which had been placed in the canal. Examination, two years later, shows perfect cure. No support worn.

CASE V.—March 4, 1890. Mrs. M. A. O'N., aged seventy-five years. Dr. Thomas Stone asked me to see this patient, who had been suffering from acute symptoms of strangulated hernia for thirty hours. All attempts at reduction had proven unavailing, and the woman was rapidly passing into a state of collapse. I found her in extreme pain, vomiting frequently, and looking as though she might die at any moment, and a hard tumor the size of a hen's egg in the left femoral space. The woman and her daughter lived, ate, and slept in the same seven-by-nine room, and only one small lamp could be obtained to furnish light. More unfavorable circumstances could scarcely be imagined. It was with difficulty that a small amount of hot water could be obtained. The case being desperate, ether was at once given by Dr. Stone, and the woman's condition was such that with a few breaths she was sufficiently anæsthetized to allow of the incision being made. The sac was opened at once and a small amount of brown fluid escaped. The contents consisted of a small mass of adherent omentum and a knuckle of gut both in very bad condition. After cutting the constriction at Gimbernat's ligament, the omentum was brought down and ligated with silk, at a point high enough to insure

normal omental tissue. The intestine was very black, but after removing the constricting band and the repeated application of hot sponges it began to regain its normal color, and was deemed safe to return to the abdomen. The sac was dissected out and the canal closed by silk.

The woman rallied promptly, and within ten days was entirely well, perfect primary union having taken place. A light truss was worn from choice for a time, and no recurrence has occurred. (This case was reported to New York State Society February 5, 1895.)

CASE VI.—September 18, 1891. S. W. G., banker, aged forty years, has had irreducible scrotal hernia for ten years. No attempt at treatment has been made. Has never had symptoms of strangulated hernia. He is informed that no form of treatment except an operation will be of any benefit to him, and he decides upon this measure.

Operation at the Post-Graduate Hospital, assisted by house-staff. Incision from external ring down to scrotum, and a large mass of omentum found in the tunica vaginalis. Very few adhesions were found at the base of the tumor, but about its neck they were very numerous and firm. These were broken up and fresh omentum brought down for amputation. Fourteen heavy silk ligatures were used in its ligation. The canal was closed by the Barker method. The patient made a rapid recovery and left the city at the end of the third week.

Recurrence of hernia occurred at the end of five or six months, but has been easily controlled by means of a truss.

CASE VII.—February 10, 1892. H. M., grocery clerk, aged nineteen years, had for past twelve years an irreducible inguinal hernia on right side.

Operation at the Post-Graduate Hospital, assisted by house-staff. Upon incision a small piece of omentum was found in the sac, but below this and attached to the cord was a bundle of cysts resembling large white grapes in outline. These were so intimately connected with the cord that they could not be dissected out, but were broken up and destroyed. The omentum was tied off with silk and the canal closed by the Barker method. He made a very rapid recovery and left the hospital on the twentieth day. No recurrence.

CASE VIII.—April 26, 1892. Mrs. T. W. N., wife of a physician, aged thirty-five years. Right femoral hernia, size of hen's egg, strangulated twenty-four hours. Pain severe, vomiting constant and of a fæcal odor. Taxis had been thoroughly tried.

Assisted by Dr. Barker and patient's husband, an operation was begun at once and without further attempts at reduction. Besides a small amount of dark fluid the sac contained about three inches of deeply congested intestine and a small piece of inflamed omentum. The constricting band was at Gimbernat's ligament. After dividing this, both the bowel and omentum were brought down, the former for examination and treatment and the latter for amputation above the line of constriction. The omentum was tied off with silk and returned to the abdomen. The bowel was treated with hot cloths for about ten minutes and then returned. Neck of the sac tied off with silk and the femoral canal closed. Recovery was prompt and without event. From choice the patient still wears a light truss, although there is no evidence of recurrence. (Reported to New York State Society, February 5, 1895)

CASE IX.—May 4, 1892. Mrs. A. L., aged thirty-six years, has had a tumor in the right groin for the past four years. She believed that it formerly disappeared at night, but it has not for the past two or three years. At times she has had sharp attacks of colic, but she did not notice any particular change in the tumor at these times. She finds that she cannot lift or do her ordinary work with the same comfort as formerly. Attempts have been made to reduce this tumor, and she has worn for a time a concave pad; but the use of the latter was attended with considerable discomfort.

Operation at the patient's home, assisted by Dr. Goldschmidt, of California, an attendant at the Post-Graduate Hospital. Incision revealed a thin sac enclosing a pear-shaped piece of omentum, with a small neck where it passes through the femoral opening. Owing to the small size of the neck of the tumor it was tied off with a single ligature of heavy braided silk, cut off, and the stump dropped back into the abdominal cavity. The sac was tied off, also with silk, and the canal closed with the same. Silk used throughout the operation. Recovery prompt and without event. Bandages removed on the tenth day and perfect union found.

No recurrence up to this date, January 1, 1895.

CASE X.—November 26, 1892. Mrs. H. A. C., aged forty-six years. About one week since I was asked by Dr. Dimock to see this patient. I found her with an irreducible and somewhat inflamed right femoral hernia. It had, until recently, been reducible, but her truss had gotten out of order and allowed it to protrude. She was very anxious to avoid an operation, and was therefore kept in bed for

nearly a week while attempts at reduction were made. This could not be accomplished, however, and she finally consented to more radical treatment.

Operation at the city residence of patient, assisted by Dr. Toms and Dr. Dimock. Dr. John Woodman giving the ether. On opening the sac the omentum was not only adherent, but was irreducible on account of its size and shape. The body of the tumor was the size of a butter-nut, while at its neck it was no larger than a lead-pencil. Its neck was ligated with silk and allowed to return within the abdomen. About four ounces of omentum were removed. The sac was then dissected out, and tied off at its neck as high up as possible. Its stump was reduced within the femoral ring and the latter closed in the usual way. Silk was used to close the skin, in fact throughout the operation.

She had no temperature or pain worthy of mention, and on the tenth day, when the dressings were removed for the first time, perfect primary union was found. After complete recovery she wore a light truss from choice for about one year.

Last examined, two years after operation, and there was no indication of recurrences at that time.

CASE XI.—May 12, 1893. J. F., aged thirty-four years. Left scrotal hernia irreducible for ten years. Had never worn a truss. The tumor was the size of two fists. Had never had strangulation, and was only uncomfortable from the size and weight of the tumor. Patient weighed fully 200 pounds.

Operation at house of patient, assisted by Dr. Ramon Guit  ras. Dr. Charles M. Dowd giving the ether. Incision was down to external ring and sac was opened from this point, about one and a half inches down to top of scrotum. Through this opening, after the adhesions were broken up, the omentum was brought out, and as much as would protrude was brought down through the canal, and ligated by about twelve heavy silk ligatures and the stump allowed to retract within the abdomen.

The neck of the sac was then excised, after being ligated with No. 10 braided silk, the stump reduced to the internal ring, and the ends of the surrounding ligature carried through the abdominal wall; one well towards the median line, and the other out towards Poupart's ligament. This formed the first stitch in closing the canal after the Barker method. Four other stitches of heavy silk were applied in the anterior wall of the canal by means of a long blunt needle and the

skin closed by silk. Perfect primary union was obtained in ten days, and the patient recovered without any event worthy of notice. A light truss was applied.

December, 1894. Dr. Guit  ras has recently assured me that the patient is perfectly cured.

CASE XII.—August 30, 1893. G. M. S., aged thirty-six. About one year before the date of this history this man came under my care for mechanical treatment for a large and previously neglected scrotal hernia, sent by Dr. Alexander B. Hunter. After considerable trouble it was brought under control and the man passed from my observation. Recently he had become careless about wearing the truss when in the house, and the hernia came down to nearly its original size; he became sick and had quite severe abdominal pains, and found that he could not reduce his hernia. I saw him on the following day. He had vomited once, but symptoms were not severe.

In manipulating the tumor I distinctly felt a portion of it go back into the abdomen, but the balance and by far the greater portion could not be reduced. As he expressed himself relieved of the most urgent symptoms, and feeling certain that no more intestine remained in the tumor, the local application of ice was ordered, and he was not seen until the following day. Attempts then, and on three succeeding days, failed entirely to reduce the tumor. All indication of the involvement of the bowel had left him, and while the tumor was hard, hot, and sensitive to pressure it was not painful at other times.

He was informed that his choice was now between recovery with an irreducible hernia for life and an operation which would probably result in a complete cure. After a few days' consideration he consented to the latter alternative.

Operation at the Post-Graduate Hospital. When the sac was opened about ten ounces of coffee-colored fluid and broken-down tissue escaped. A large mass of inflamed and dark-colored omentum, firmly adherent to the interior of the sac, was found. When loosened it was found that the hardening had extended inside the abdomen, and under gentle pressure an equally large mass was brought from the abdominal cavity. Normal tissue was thus reached through which to amputate it. About twenty heavy silk ligatures were used in tying off the omental mass. The neck of the sac was tied by silk and cut off, the fundus being allowed to remain in the scrotum. The canal was closed by the Barker method. There was some abdominal pain for four or five days, due more to the inflation of the bowels with gas than to any inflammatory action.

He made a prompt and in every way satisfactory recovery, with a small sinus, however, which remained open five or six months. This gave so little trouble that he would not allow of the opening of the parts to find the offending stitch. It eventually closed without the loss of stitch. As the patient was a very heavy man, a light truss was applied, and is still worn, although there is no indication of a recurrence. (Reported to New York State Society, February 5, 1895.)

CASE XIII.—November 17, 1893. Mrs. M. R., aged thirty-six years, was first seen with Dr. Thomas Stone on October 30, 1893. I then found a small tumor at the external abdominal ring, somewhat painful to touch, hard, hot, and the skin over it slightly red.

The swelling was discovered about one week before, and Dr. Stone was called. He found a larger protrusion than now seen, and reduced a good part of it, after which the acute symptoms from which the woman was suffering subsided, but the swelling of smaller size continued. Believing this swelling to consist of inflamed incarcerated omentum, which had become adherent, and the woman refusing absolutely to submit to an operation, ice over the tumor and complete rest were advised.

The case was again seen, by request of Dr. Stone, on November 16, when the tumor was found somewhat larger and fluctuation was present. Scarcely any pain had been experienced since the partial reduction by Dr. Stone. The woman positively refused ether, but would submit to an incision under cocaine. Fifty minims of a 4-per-cent. solution of cocaine were injected around the base of the tumor, and five minutes after the incision was made. About two ounces of dark fluid and broken-down tissue escaped, and the cavity was found to extend into the canal but not into the abdominal cavity. A small piece of omentum was found to have sloughed off. The cavity was packed with iodoform gauze and allowed to close by granulation, which it did promptly.

Ultimate result not known. (Reported to State Society.)

CASE XIV.—November 10, 1893. J. S., aged twenty-seven years. This man came to my clinic early in November, 1893, for the relief of a right scrotal tumor, from which he had suffered for twelve years. He had tried various trusses and different truss-fitters without success, nor did he care to experiment further with mechanical means. The case was carefully examined before the attending class, and the opinion given that the tumor was largely fluid, and a very much thickened tunica vaginalis with possibly some intestine.

He was put in the Post-Graduate Hospital, and the operation revealed the fact that the opinion given was wrong in every particular, except that the sac was very thick. An elongated piece of omentum extended from the abdominal cavity to the bottom of the scrotum, where it was firmly attached to the hernial sac. The entire sac was dissected out to the internal ring, and the canal closed by the method of Bassini, kangaroo tendon being used in the deep structures and silk in the aponeurosis of external oblique.

He made a prompt and uneventful recovery, and left the hospital on the eighteenth day. Two of the silk sutures came out later. Never wore truss after operation. Case is shown at Surgical Section of the Academy of Medicine, March 11, 1895, and is perfectly sound.

CASE XV.—February 13, 1894. H. M., aged twenty-five years, has had hernia on left side for many years, and has been unable to get a truss that would control it. It is gradually getting larger, and interferes quite seriously with his duties as a grocery clerk. Has never had strangulated hernia.

Operation at the Post-Graduate Hospital, assisted by the house staff. On opening the sac after splitting the canal to the internal ring, it was found to contain an enormous mass of omentum that was not adherent. It was amputated at the highest point attainable, eighteen or twenty No. 8 ligatures being used. The stump was dusted with aristol and returned to the abdomen, the canal being closed by the Bassini method. Kangaroo tendon was used for deep sutures and silkworm gut for the aponeurosis of the external oblique. Silk in the skin.

Perfect union was found at the end of the tenth day, and he left the hospital on the eighteenth day. Removed omentum weighing twenty ounces.

In perfect condition when seen one month later.

CASE XVI.—March 17, 1894. A. McC., aged ten years. This little girl has had left femoral hernia for two years, and during the past six months it has not been reducible. She wore a truss with a concave pad over the tumor for some time, but the mother, being informed of the danger and constant annoyance to which the child would always be subject, consented to an operation. The tumor is about the size of an English walnut, but has given little pain or inconvenience.

Operation at the Post-Graduate Hospital, assisted by house-staff. Incision revealed a very thick sac, inside of which was a piece of

adherent omentum about the size of one finger. This was tied off with silk ligatures and allowed to retract within the abdomen. The sac was dissected out and tied off with silk flush with the femoral opening and the stump replaced well within the abdomen. Femoral canal closed by silkworm-gut sutures passing up through Poupart's ligament and down into the fascia lata. Skin closed with catgut. Dressings removed on the eighth day and perfect primary union found. Left the hospital on the sixteenth day. No truss or support worn.

Examined December 27, 1894, and cure found perfect at that time.

CASE XVII.—March 24, 1894. J. B. N., aged fifty years. This man, weighing 200 pounds, has had hernia on right side ever since he can remember. Was exempt from service in the army when drafted during the war. Never wore a truss. The hernia has not returned to the abdomen for the past eight years. It equals in size a large coconut, and does not diminish to any extent under manipulation when in a recumbent position. He has had three distinct attacks of strangulated hernia within the last four years, the last while at sea, on a "whaler," where skilled assistance was beyond reach. After eight hours of the most agonizing pain and vomiting, a sufficient amount of the hernia slipped back to afford him relief. The attack was brought on suddenly by pulling on a rope. As the only possible means of affording him relief, an operation was advised and consented to.

Operation at the Post-Graduate Hospital, assisted by house-staff. The canal was opened at once to the internal ring. When the sac was opened it was found full of omentum with adhesions at many points, and with tough bands running in every direction, which held the mass firmly in place. No intestine was found in the tumor. Eighteen No. 8 ligatures were used in tying off the omentum, and its stump was dusted with aristol and dropped back into the abdomen. The entire sac was then dissected out, and its neck tied off at the peritoneal surface. The canal was closed by the Bassini method, three kangaroo tendon sutures being used back of the cord, and five silkworm-gut sutures were placed in the aponeurosis of the external oblique muscle, the skin being closed by catgut. No pain followed except what was due to inflation of the bowels with gas, and the temperature did not go above 99° F. at any time. On the tenth day the bandages were removed for the first time, and perfect union was found, except a very small spot at the lower angle of the wound, which closed within three days.

On the nineteenth day he left the hospital and made a visit in Brooklyn, and on the twentieth day after the operation he returned to his home, a three hours' ride, and attended a reception, which kept him up until 2 A.M. It is needless to say that these indiscretions were without my knowledge or approval, but did him no harm.

December 22, 1894. The patient has been carefully examined to-day, over ten months since the operation, and the parts are found perfectly solid. He appears stronger than on the other side where hernia never existed. He wore a bandage for about two months, since which he has worn no support of any kind.

CASE XVIII.—March 29, 1894. G. P. J., aged thirty-six years. Eight years since this patient developed right femoral hernia. His physician sent him to buy a truss. The truss hurt him so much that he discarded it and went without any support. About four years ago the hernia became irreducible and has been so since that time. He has had some discomfort, but has never experienced symptoms of strangulation.

Operation at the Post-Graduate Hospital, assisted by house-staff. A dense sac thickly covered with fat was found, and inside of this was a small piece of adherent omentum. The omentum was tied off with silk, as also the sac at its neck. The femoral opening was closed with three silkworm-gut sutures, through Poupart's ligament above, and the pubic portion of the fascia lata below. The skin was closed by catgut. Dressings were removed on the sixth day and union found perfect. No temperature. No pain. Left the hospital on the eighteenth day.

Seen two months later in perfect condition. No support worn.

CASE XIX.—April 17, 1894. J. D., aged thirteen years. Right inguinal congenital. Has had hernia since infancy, and had been attended at irregular intervals in the out-door clinic during the past eighteen months. On one occasion he threw away his truss, and on another he intentionally broke it in order to avoid wearing it. Was brought to the hospital by his aunt with his hernia down in the scrotum, hard, hot, and sensitive to pressure. He said that it had been forced down three days before while coughing, and that he had been in pain with it ever since. Pain was across upper part of abdomen on line with navel. Had been sick at stomach, but had not vomited. Bowels had not moved since hernia came down. As there appeared to be a large amount of fluid in the tumor, and as the aunt was not authorized to leave him for operation, aspiration was carefully per-

formed and about four ounces of fluid were drawn off, but efforts at reduction were painful and failed. The fluid was bloody serum. Operation was advised, and to-day the mother's consent was obtained to put the boy in the hospital. To-day he had been vomiting, looks badly, and has severe pains.

Operation at the Post-Graduate Hospital, assisted by house-staff. On opening the sac the same amount of dirty brown fluid as that drawn off yesterday was found, besides which it was occupied by a piece of omentum as large as an adult hand, in a high state of inflammation. This had formed firm adhesions to the surrounding sac and to the internal ring. In order to free these adhesions and bring healthy omentum outside the abdomen it was necessary to extend the incision one inch above the internal ring. All inflamed omentum was cut away after the application of thirteen silk ligatures, and the deep structures of the canal were closed back of the cord by kangaroo tendon. The aponeurosis of the external oblique was closed by seven silkworm-gut sutures, and the skin by catgut. The stump of the omentum was dusted with aristol to prevent intra-abdominal adhesions. The point of constriction was, in this case, high up in the canal at or near the internal ring. There was considerable local peritonitis, and doubtless without operative relief the boy would have died from this inflammatory condition becoming general.

On the morning following the operation, during the momentary absence of the nurse, the boy got out of bed and walked across the room. On her return she found him looking out of the window. That evening his temperature was 101° F., but on the next morning it had dropped to 99° F., notwithstanding the fact that during the night the boy had torn the dressings entirely off, leaving the wound exposed. Some swelling of the scrotum being present, an ice-bag was applied for twelve hours, after which he made a rapid and perfect recovery with complete primary union, leaving the hospital on the fourteenth day apparently perfectly cured.

CASE XX.—May 3, 1894. Dr. G. P. L. R., aged fifty-five years. Has had very troublesome and uncontrollable right inguinal hernia for past five years. He tried unsuccessfully to adjust a truss that would retain it. Truss-wearing has been very painful to him, and he has come to New York with the express purpose of having an operation done. I operated upon and cured his son about ten years since by the Heaton method. Owing to the pain from which he has suffered, he has become addicted to the morphine and cocaine habits, which he wishes to abandon during his confinement to bed.

Operation at private house, assisted by Dr. George E. Doty ; Dr. W. A. Walker giving the ether. The canal was opened to the internal ring and the sac incised. Omentum was found firmly adherent to upper part of sac and at the internal ring, as well as to interior of abdominal wall. The adhesions were broken up with difficulty and normal omentum brought down for ligation. In order to accomplish this the opening in the abdomen had to be enlarged above internal ring, and adhesions inside the abdomen broken up. The omentum was ligated with eight silk ligatures and cut away. The sac was ligated with catgut flush with the peritoneal cavity and removed. The deep structures back of the cord were united by the kangaroo-tendon sutures, and an additional one at upper angle of the wound above the cord. The aponeurosis of the external oblique muscle was brought together by five silkworm-gut sutures, and the deep fascia and skin by catgut. Aristol was dusted upon the stump of amputated omentum.

Recovery was prompt and without incident. The bandages were taken off on the tenth day for the first time, and perfect union was found. The morphine and cocaine were both abandoned during convalescence.

The doctor returned home in four weeks apparently perfectly cured, and has recently written me of his continued good health.

CASE XXI.—May 17, 1894. W. W., aged twenty-seven years. A tall robust man, six feet tall, and weighing 190 pounds, has had double inguinal hernia for years. On the left side the hernia appeared to be retained by the German truss which was and had been worn for several years. On the right side was a large tumor extending down into and filling that side of the scrotum. This tumor had not been reducible to the abdominal cavity for the past five years, and was believed to contain adherent omentum. The man had been brought to me with the hope that I might afford him relief by some form of mechanical appliance. In addition to the condition described he gave a history of three attacks of peritonitis from unknown causes. He believed that one of these attacks occurred before either hernia was discovered. The hernia on the right (irreducible) has become more and more troublesome every year. The pressure of the truss-pad across the neck of the tumor appears to retain the intestine, and no indication of intestinal strangulation has been experienced. There is a history of inflammatory action in the omental mass. The patient was informed that no relief except by operation could be afforded him, and to this he finally consented.

Operation at the Post-Graduate Hospital, assisted by house-staff. Ether well taken. Right side first operated upon, and on incising the sac a large mass of hypertrophied omentum was found adherent in many places, especially so at the neck of the sac. After considerable trouble normal omentum was brought down and ligated by ten silk ligatures, its stump was dropped back into the abdomen, the sac dissected out, and the canal obliterated in accordance with the Bassini method. The cut edge of the omental stump was dusted with aristol before being returned to the abdomen in order to prevent the freshened surfaces forming adhesions with the intestines. Silkworm gut was used to close the aponeurosis of the external oblique, and catgut for the skin.

Operation on left side. The canal was opened up to the internal ring, and it was found that the omentum was firmly adherent in the upper part of the canal and to the anterior wall of the abdomen in the vicinity of the internal ring. Great difficulty was experienced in breaking up these adhesions sufficiently to amputate the omentum where its structure was normal. This was finally done; it was tied off with several silk sutures, the stump reduced, and the canal closed the same as on the opposite side. The time required for the two operations was little over one hour. The patient did well for the first thirty hours after the operation, when the temperature suddenly ran up to 103° F.; pulse 140, with considerable tenderness over the left inguinal region; distention of the bowel with flatus, and some vomiting. Report from the laboratory showed that the urine contained granular casts and some albumen. High enemas were given, and after the bowels had moved freely all symptoms improved. On the following day temperature had dropped to 99° F.; his pulse to 114. On the sixth day profuse suppuration began on the left side, and later extended to the right side. Only the superficial fascia was involved, but it extended up under the skin fully six inches on the left side, and an incision was necessary to insure perfect drainage. On the right side the pus did not burrow up so far.

The patient left the hospital in six weeks perfectly healed and with an apparently satisfactory result. Examined February, 1895. No indication of recurrence.

CASE XXII.—May 21, 1894. J. M., aged thirteen years, has had hernia on right side since two years of age. Has worn trusses part of the time. At one time he thought that he was cured and left off wearing the truss. Hernia came back after two years.

As his parents are now very desirous of his being cured, I have placed him in the Post-Graduate Hospital for operation. A very thick sac was dissected out to the internal ring. A small piece of omentum was found adherent to the internal surface, tied off with silk and cut away. The canal was closed by the Bassini method, three kangaroo tendon sutures being used back of the cord, and silkworm-gut sutures placed in the aponeurosis of external oblique in front of cord. Skin closed by catgut. The temperature was normal on the following day, and he made a very prompt recovery by primary union.

Was seen two months later and was in perfect condition. No truss was worn subsequent to the operation.

CASE XXIII.—May 23, 1894. L. W. M., aged twenty-seven years, has had hernia on the right side since early childhood. All trusses have failed, and he cannot remember when it was wholly reducible. When he was fifteen years of age this tumor was tapped under the supposition that it was hydrocele. Following this was an acute inflammatory condition which lasted some time, and from which he was very sick.

Operation at the Post-Graduate Hospital, assisted by house-staff. A large mass of omentum was found adherent to interior of sac, especially at its neck and the internal ring. Seven No. 8 sutures were placed upon the omentum and it was cut away. The neck of the sac from the internal ring to the top of the scrotum, was dissected out, but the fundus was left in the scrotum, as it was so intimately connected with the cord as to make it impossible to separate without the risk of destroying the vessels and nerves leading to the testicle. The canal was closed by the Bassini method, three kangaroo tendon sutures being placed back of the cord, and six silkworm-gut sutures in the aponeurosis in front. Catgut was used in the skin.

An uninterrupted and prompt recovery was made.

December 1, 1894. Has been seen a number of times since, and the cure seems perfect. He wears an abdominal belt. One silkworm suture came to the surface and was removed.

CASE XXIV.—June 4, 1894. W. H. B., aged forty-one years, has worn a German truss for several years for what was believed to be reducible hernia on the right side. During recent years the truss has caused some pain, and for this reason he has decided to have an operation. He also wishes an operation for a good-sized varicocele on opposite side. It should be especially noticed that the action of this

German truss is always to close the lower part of the canal, and to allow the upper part to remain open and of funnel shape. Hence the internal ring is usually occupied by a portion of the protruding viscera at all times.

Operation at the Post-Graduate Hospital, assisted by house-staff. Varicocele was first operated upon by subcutaneous ligation by the "Ogston" method. This was done after the patient had taken ether, and some difficulty was experienced in securing all the abnormal veins in the loop of silk, without risk of tying off the normal elements of the cord.

The result rather indicates that some of the dilated vessels were not occluded, and shows the importance of doing this operation with the patient standing. He is, however, much improved over his former condition.

Hernia.—The sac was exposed and opened to the internal ring. At its upper part was found a piece of omentum the size of four fingers adherent not only in the internal ring, but to the interior of abdominal wall as well. After freeing the adhesions inside the abdomen the omentum was gently brought down and ligated with six No. 8 silk ligatures and amputated. The stump was dusted with aristol and dropped back into the abdomen. The canal was closed by the Bassini method, three kangaroo tendon sutures back of the cord, and six of the same material in the aponeurosis. Catgut was used for the skin. Several vessels were ligated.

Subsequent History.—He came out of the ether well, and on the second day his temperature was 99° F., and he had some abdominal pain due to flatulence. He was much annoyed by a patient in an adjoining bed. On the third day, owing to a remark by the nurse, he got the idea that he had bad symptoms, and he got very much excited and had a "nervous chill." He had been subject to chills of this character. His temperature ran up suddenly to 103° F. He was changed to a private room, and by evening his temperature was nearly normal again. His bandages had been removed, but everything was found in perfect condition. After this he made a most satisfactory recovery, and returned to his home in Boston on the twentieth day after the operation.

He was examined in January, 1895, and found in perfect condition. No support has been worn.

CASE XXV.—June 7, 1894. H. P., aged thirty-seven years. Sent by Dr. G. M. McCombs, Clayton, N. Y. Has had double ingui-

nal hernia for eight years, and has worn a truss a good part of the time. Has worn the "elastic" truss for past four years. The hernia on the right side has not been reducible for past eight months, and he has had three attacks of strangulated hernia. In the last attack the omentum became very much inflamed, and is still very much hardened. The size of the irreducible mass is equal to four fingers of an adult hand, and extends down to the testicle. The left side is supposed to be of more recent origin and is apparently wholly reducible. It does not go fully into the scrotum. The patient has suffered a great deal with his ruptures and comes to New York for operative relief.

Operation at the Post-Graduate Hospital, assisted by Dr. Wynkoop and house-staff. The right side was first opened, and, as expected, was found with a mass of omentum as large as the hand adherent to all parts of the sac. Ten No. 8 silk ligatures were applied, and the omentum cut away, the stump dusted with aristol and dropped back into the abdomen, and the canal closed by the Bassini method, three kangaroo tendon sutures back of the cord and six silkworm-gut sutures in the aponeurosis. On the left side the upper part of the sac was full of adherent omentum, and the adhesions extended well into the abdomen. A piece of omentum as large as that on the right side had to be removed. This operation was more difficult than the first one, owing to the adhesions being so far up. Eight silk ligatures were applied to the omentum and the canal closed as on the other side. The sacs of both sides were ligated flush with the peritoneal cavity and removed. The man was on the operating table nearly two hours, but was in good condition when taken off. His temperature was at no time above 99° F., and he made a prompt recovery without a drawback. He returned to his home 300 miles away on the twenty-first day. Reports from him two months later were very favorable. No indication of recurrence at that time.

December 15, 1894. Dr. McCombs reports him in good condition. No recurrence.

CASE XXVI.—June 9, 1894. A. B., aged eleven years. This little girl has been under my care for mechanical treatment for three years, and while the hernia had always been under perfect control, there appeared to be no tendency towards a cure. An operation was therefore advised. Hernia (inguinal) on right side.

Operation at the house of her parents, assisted by Dr. George E. Doty; the family physician, Dr. W. D. Bell, giving the ether. A

very thick sac extending about two inches below the external abdominal ring was found. This was dissected out to the internal ring and opened. Inside was found an elongated piece of omentum two inches long extending to the bottom of the sac. It was quite evident that this piece of omentum had occupied the canal and sac for a long time, and with the thickened sac was quite sufficient to prevent a cure. The omentum was ligated with silk and cut off, the sac ligated by catgut, and the canal closed by the Bassini method, with kangaroo tendon for the deep sutures and silkworm gut for the aponeurosis. The patient made a very rapid recovery by primary union.

December 8, 1894. Six months later this patient was examined and found perfectly cured. She seems stronger on side of operation than on the other side where hernia never existed.

CASE XXVII.—June 12, 1894. J. B., aged forty-nine years, has had hernia on right side for ten years, and on left side for two years. Has not been seriously troubled with either of them until recently, although that on the right side has not been reducible for past six years. German and elastic trusses have been worn with pad pressing across the neck of the protruding omentum. Two attacks of strangulation have occurred on the right side, at which times his physician has been able to reduce enough of the tumor to relieve the urgent symptoms. The last attack was three weeks since attended by extreme pain and vomiting, and a hard, sensitive, hot tumor, the size of one's fist, remains in the scrotum, which is believed to be omentum in an inflammatory condition. Over the neck of this tumor is being worn with considerable discomfort a truss-pad held in place by an elastic truss. This same truss seems to support by the pad the hernia on the right side. The patient is captain of a fire-company, and in his present condition is disqualified from active duty. He recently entered one of the large hospitals to obtain relief, but became alarmed and deserted before the day appointed for the operation.

Operation at the Post-Graduate Hospital, assisted by Dr. Wynkoop and other members of the house-staff. The right (irreducible) side was first operated upon, the canal being at once opened up to the internal ring. The sac was then opened and found to contain a mass of deeply-congested omentum adherent to almost all parts with which it came in contact. This hardened mass communicated by a narrow neck with another almost equally as large within the abdomen. The neck of the sac not being large enough to allow this mass to come through it was enlarged, the adhesions within the abdominal

cavity broken up, and the inflamed omentum was brought outside, where it was ligated with twelve silk ligatures and cut away. The sac was examined and found peculiar in that it communicated by a dense cartilaginous ring with a cavity lower down. This lower cavity was the size of a small orange and filled with fluid.

The entire sac was dissected out and ligated flush with the peritoneal cavity and the canal closed by the Bassini method, kangaroo tendon being used for all sutures in the muscular and aponeurotic structures. On the left side the canal was opened to the internal ring, and sac was found to contain in its upper part and in the vicinity of its neck a small piece of adherent omentum which was ligated and cut away. The canal was closed as on the opposite side. The patient made a prompt and uneventful recovery. The bandages were removed on the eighth day and perfect primary union found.

He left the hospital on the nineteenth day, and resumed active service at the end of the sixth week, wearing an abdominal belt.

CASE XXVIII.—June 15, 1894. Miss L. O'N., aged twenty-four years. About two years since this patient discovered a small tumor in the left groin, and shortly after came under my care. She was decidedly opposed to an operation, and for this reason a truss with a concave pad was adjusted and carefully worn up to this time. During the year that this was worn there was very little change in the tumor. At times it gave her some pain, but at no time were there symptoms of strangulation. The size, shape, and action of the tumor all led to the suspicion that it might be lipoma instead of hernia. Operation was advised and finally consented to.

Operation at the Post-Graduate Hospital, Dr. Wynkoop and other members of the house-staff assisting. It was found to consist of true omentum covered with thin peritoneal sac. The neck of the omentum was very small and was tied off with one silk ligature. The femoral opening was closed with silk. Perfect primary union was found to have taken place when the bandages were removed on the tenth day.

She left the hospital on the fourteenth day with bandage, which she still wears.

CASE XXIX.—June 21, 1894. J. R. S., aged twenty-two years. March 10, 1894, this patient was sent to me by his physician, Dr. A. W. Lawrence, as a case of varicocele, and which I had suspicions of first that it was not, but could not decide positively until he had worn a truss for a few days. In feeling and appearance it presented

all the characteristics of varicocele, nor could it be distinguished by the ordinary test for fluid tumor,—*i.e.*, by compressing the canal before the patient lies down, and keeping the pressure there until the scrotal tumor has disappeared, in order to detect the passage of solid matter beneath the fingers. The tumor was slowly reducible, no solid matter could be detected, and the external abdominal ring was not large, but with a truss the tumor was almost wholly retained. The patient found, however, that if the tumor was kept entirely within the abdomen he was soon troubled with colicky pains, which disappeared as soon as a part of the swelling was allowed to protrude into the scrotum. As there was no prospect of improvement under mechanical treatment, an operation was consented to.

Operation at the Post-Graduate Hospital, assisted by Dr. Wynkoop and others of the house-staff. The fundus of the sac when opened was found empty, but midway between the external ring and the internal ring the omentum was found firmly adherent. These adhesions were quite extensive at the internal ring, even extending within the abdominal wall; considerable trouble was experienced in loosening these adhesions from the peritoneal surface. Normal omentum was brought down and ligated with eight silk ligatures, and a piece as large as one's hand was cut away, the stump dusted with aristol and dropped back. The canal was closed by four kangaroo-tendon sutures back of the cord and eight interrupted sutures of the same material in the aponeurosis of the external oblique. Two splits were found in the aponeurosis of the external oblique muscle on making the first incision, located three-quarters of an inch towards the median line parallel with the canal. These are believed to have resulted from the strong truss pressure used in the attempts to retain the hernia before the operation was consented to. They were brought together by kangaroo tendon.

The subsequent history of the case is without event. The bandages were removed on the tenth day for the first time, and the wound was found perfectly healed by primary union. The man left the hospital on the twenty-first day.

Examined and found in perfect condition December 19, 1894. Has never worn a truss or support of any kind.

CASE XXX.—June 11, 1894. J. L., aged four years. This child was brought to my clinic some time since, and mechanical treatment tried with but little success. The hernia appeared to be reducible, but was only partially retained even by a strong truss. The child was therefore placed in the hospital.

Operation at the Post-Graduate Hospital, assisted by Dr. Winston and staff. A very thick sac was found consisting of tunica vaginalis, within which the protrusion had occurred; in the neck of this was found adherent omentum. A piece as large as four fingers was ligated and removed. The neck of the sac was tied off with catgut, and the canal closed by three kangaroo tendon sutures back of the cord and five in the aponeurosis in front. Skin closed by catgut. It was not reported to me until after the operation that albumen had been found in the urine on the morning preceding. Ether was given and no ill effects followed, the albumen remaining for several days subsequently. The child made a perfect recovery, the bandages being removed on the tenth day and complete union found.

Seen two months later in perfect health. No truss.

CASE XXXI.—September 25, 1894. F. H., aged thirty-six years. Has suffered for several years with sharp attacks of abdominal pain, and has been treated for all sorts of intestinal and gastric diseases, even cancer of the stomach.

Dr. C. Fulda, of Brooklyn, was the first to suspect the true cause of his trouble, and he sent him at once to me. He describes these attacks as coming on after any exercise, and the pain is located just above the umbilicus and principally to the left of the median line. Some soreness is developed in this region at these times. This pain is quite severe in character and lasts from two to four hours, being somewhat relieved by the recumbent position. Two inches above the navel, and one and a quarter inches to the left of the median line I find a small round hard tumor the size of a large hickory-nut. This is freely movable beneath the skin, but cannot be reduced into the abdominal cavity. It is not sensitive, but the patient informs me that it gets so at the time of the attacks of pain already referred to. The diagnosis of irreducible ventral hernia is made and an operation is advised.

Operation at the Post-Graduate Hospital, assisted by Dr. Stimson and staff. On cutting down, a thin peritoneal sac was found filled with omentum. This had been forced through a very small aperture at the edge of the rectus muscle. The neck of the tumor was no larger than an ordinary lead-pencil, while its body was as large as the ball of one's thumb. The omentum, after being freed at its neck, was ligated with silk and dropped back into the abdomen. The neck of the sac was then tied, and the aperture in the abdominal wall closed by silkworm gut. The skin by catgut. The

man recovered without pain or any other incident worthy of mention. There was found perfect union on the removal of the bandages on the eighth day, and he was allowed to go home on the tenth.

When seen, three weeks later, he expressed himself greatly relieved from the former pains, having had no attacks, which had previously occurred two or three times a week.

CASE XXXII.—September 28, 1894. Miss M. P., aged thirty-two years. This young woman developed hernia on the right side three years ago. She showed it to her physician, who assured her that it was only a strain, and that it would amount to nothing.

One year later she came under my care, and I found her with a medium-sized reducible femoral hernia. I put on her a cross-body, hard-rubber spring with a water-pad, which she was to wear for three to six months, and then come to have it changed to the hard pad. She was informed that this would be necessary on account of the flattening out of the water-pad. The hernia was perfectly held at this time, and she not only did not come back, but she was even very careless in the use of the truss, sometimes going in the street without it. Two weeks previous to the present date the hernia came down, and she could not reduce it. It was not actually painful, but caused her much discomfort. About three days later she came to my office and found that I was out of town for three or four days, and she would not see my assistant, Dr. Doty. Upon my return she called, and I found her with a hard tumor the size of an English walnut in the femoral space. It was hot, somewhat sensitive to pressure, and could not be returned into the abdomen.

As she was very much opposed to an operation on account of a sick and nervous mother, I sent her to bed and had ice applied. Two days were wasted in this, and two more in using the pressure of a shot-bag, when she finally consented to an operation.

Operation at the home of patient, assisted by Dr. George E. Doty. Dr. John Woodman giving the ether. On opening the sac about two ounces of a coffee-colored fluid (odorless) escaped, and a piece of omentum about the size of one's thumb was found. It was adherent to surrounding parts, dark in color, intensely congested, and very hard. Its neck, which was firmly adherent, was loosened and ligated by No. 8 silk, and, after cutting off, the stump was dusted with aristol and dropped back into the abdomen. The sac was dissected out and tied off flush with the peritoneal cavity, and its stump pushed well within the femoral opening. Poupart's ligament was then

stitched down to the pubic portion of the fascia lata by three silkworm-gut sutures. Superficial fascia and skin closed in two layers by catgut, the wound dusted with aristol, and bichloride gauze dressings held in place by roller bandages. Recovered promptly from ether, and during the night had considerable abdominal pain, as usual after ether, and controlled by powders of bismuth, soda, and ginger. Recovery without incident. Bandage removed on ninth day, and perfect union found, and she was allowed to go about her room with bandage on.

Three months later in perfect condition. No truss.

CASE XXXIII.—January 15, 1895. J. L., aged twenty-four years. On October 3, 1893, the "Barker" operation was done on this man. In three months there was a relapse, and since there has been trouble in retaining the hernia even with quite a strong truss: Nitrous oxide gas was used as an anæsthetic for the first operation, and he had considerable trouble with his heart for several days, this time ether was used and no ill effects followed. Much difficulty was experienced in opening up the canal on account of the matting together of the tissues after the first operation. The sac was found to be very thin, and contained a finger-shaped piece of omentum about six inches in length. This was wedge-shaped as it entered the abdomen, and a piece as large as the hand was removed by seven No. 8 silk ligatures. Three kangaroo-tendon sutures were placed in the deep canal, and seven silkworm-gut sutures in the aponeurosis of the external oblique. Skin closed by catgut.

January 21. Highest temperature 99° F. Some abdominal pain on day following operation.

CASE XXXIV.—January 23, 1895. W. H. L., aged thirty-seven years, singer, first came under my care for mechanical treatment for right scrotal hernia on April 17, 1884. The hernia was a very difficult one to control, and much trouble was subsequently experienced from the extremely sensitive skin of the patient. In 1886 the Heaton injection was tried with some temporary benefit. The hernia always appeared completely reducible, but very hard to retain. Upon my advice he has consented to an operation for its cure by the Bassini method.

Operation at the Post-Graduate Hospital, assisted by Dr. Norris and the house-staff. The canal was opened at once to the internal ring, and the hernial sac found thick and tough. When this was freely opened, the omentum was found firmly adherent all about the

internal ring and within the abdomen as well. Considerable difficulty was experienced in getting the omentum down far enough to amputate it above the adhesions. This was finally accomplished, and it was tied off by eight No. 8 silk ligatures. The sac was dissected out and removed, still attached to the omentum. The canal was closed by four kangaroo tendon sutures back of the cord, and seven silkworm-gut sutures in the aponeurosis of the external oblique. The skin was closed by horse-hair.

The patient made a most rapid recovery and left the hospital on the thirteenth day.

CASE XXXV.—February 12, 1895. A. S., aged forty-six years.

Some months since this patient noticed a tumor, which was gradually increasing in size. He has no recollection of its having been reducible at any time. It has given him some pain and discomfort.

Operation at the Post-Graduate Hospital. The canal was opened to the internal ring and found to contain a thin hernial sac, within which was a mass of adherent omentum. The omentum was ligated by four silk ligatures and returned to the abdomen, after its stump had been dusted with aristol. The canal was closed by three deep kangaroo-tendon sutures and eight silkworm-gut sutures in the aponeurosis of the external oblique. Horse-hair in the skin. A small amount of superficial suppuration was found on tenth day, otherwise the man made a good recovery, and left the hospital on the twenty-third day.

RESTORATION OF THE LOWER LIP AFTER THE METHOD OF REGNIER¹

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I WISH to call attention to a case of my own, which illustrates a method of restoring the lower lip after its entire removal for epithelioma. This method was first described some four years ago, and is, doubtless, more or less familiar to most operators. Nevertheless, I have ventured, in this paper, to dwell upon it somewhat in detail. I have done so because I infer, from my failure to observe any further reference to it, both in the proceedings of this society and in general current literature, that the original description has not made the impression which I think it ought to have made.

Furthermore, the length of time which has intervened since the appearance of this description may, possibly, have dimmed somewhat a distinct recollection of its details.

I have reference to the article by Dr. E. Regnier,² clinical assistant to Professor Wölfler's clinic in Graz.

The operation itself is as follows :

The growth is removed *en masse*, together with as much underlying tissue as may be practicable, by a curved incision, convexity downward, extending from one angle of the mouth to the other. This, I think, would be best accomplished by means of a heavy pair of curved scissors, although in my own case a scalpel was used.

¹ Read before the New York Surgical Society, March 13, 1895.

² Langenbeck's Archiv für klinische Chirurgie, Part III, Vol. XLI, 1891.

It is understood, of course, that the entire thickness of the lip is involved in this incision. After stoppage of hæmorrhage, another cut is made in the following manner:

From the middle of the first incision there is measured downward, going over the prominence of the chin, if necessary, a distance which exceeds by about *one centimetre* the height of the lip removed. With the end of this line as its mid-point, a curved incision is made *twelve centimetres* long and exactly parallel with the original incision. There is thus formed a bridge-like flap. It now remains only to raise this flap from the chin by upward retraction and repeated incisions, down on the jaw, along the line of the incision just made, and to slide it up into place like the visor of a helmet. A few sutures are placed between the deep surface of the flap and the tissue, mostly periosteum, on the anterior surface of the maxilla, for the better maintenance of the flap in its new position. The lower wound may be sutured or grafted or left to granulate. As part of the dressing, a piece of iodoform gauze is tucked in for a short distance between the adjacent surfaces of the flap and lower jaw. This last procedure was varied, in my own case, by utilizing the thin strip of mucous membrane, left just under the teeth, as a partial covering for the raw upper surface of the new lip, not, however, in a continuous layer, but in a series of small, some wholly, others partially, detached grafts sutured here and there in places.

This operation, I think, not only commends itself at once for its simplicity and on its own merits alone, but also appears to still greater advantage when compared with other methods which are in more general use. For example, take the method of Dieffenbach, or of Syme and Buchanan, either one of Langenbeck's methods, or that of Malgaigne, and how much easier and simpler this one appears. It is also of rapid performance. The entire operation on my patient lasted about an hour and a quarter, and would have taken considerably less time had I omitted placing the small grafts just alluded to. Besides, the hæmorrhage happened to be considerable and necessitated a large number of ligatures. By placing the grafts, however, I think I gained about a week in the healing process, which, in Dr. Regnier's cases,

took one month, on an average, while in my patient cicatrization was complete in a little over three weeks.

On the other hand, I consider that these grafts were the cause of my losing somewhat in the height of the lip, for the reason that some were attached to the gum, and hence served to drag downward somewhat the upper margin.

One caution is to be observed, and that is to remove the entire vermilion border. If a portion is left at either angle, this causes a tendency to undue contraction and consequent narrowing of the mouth.

I must not omit to call attention to another advantage this flap has over those of other operations,—viz., the continuance of its normal blood-supply from the sides, which remains undisturbed by any twisting or stretching. It is not claimed, of course, that this method possesses any peculiar quality of prevention of recurrence, nor is it intended to supersede the wedge-shaped excision and suturing of the edges for small growths. Dr. Regnier reports twelve cases successfully treated by his method.

I append herewith a brief account of my own case.

The growth involved the entire lower lip, and overhung the chin considerably. I saw the patient, a man, in the latter part of November, 1894, when the operation was performed. The growth began eight years previously as a sore, which followed a cut inflicted by a razor while shaving, and which never healed. During the last two years it had increased rapidly, and loss of flesh and strength had been marked. No family history of cancer. Age about fifty-eight. The operation of removal and flap formation was made exactly as just described. The wound under the chin was left to granulate.

In conclusion, I desire to state, at the risk of some repetition, that nothing is claimed for this method except its *simplicity*, its *ease of execution*, and the avoidance of all risk of gangrene. It is manifest, therefore, that it can be carried out successfully as well by less experienced operators as by those of greater experience. As the former class greatly outnumbers the latter, it follows that this method should have a much wider field of application than any of the procedures more generally employed.

I. CASE OF INGUINO-LABIAL HERNIA; OVARY,
FALLOPIAN TUBE, AND CORNU OF UTERUS
IN SAC. II. CASE OF HYDRONEPHROSIS,
OF THIRTY YEARS' DURATION, WITH
CALCIFICATION OF THE INNER
PORTION OF THE WALL
OF THE CYST.

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CASE I. *Inguino-labial Hernia; Ovary, Fallopian Tube, and Cornu of Uterus in Sac.*—Mrs. S., American; married; aged forty years. Family history negative. Was always well up to six years of age. One day when she was six years old, while “see-sawing” with a companion, the playmate jumped off from her end of the board while Mrs. S. was high in the air, and she came suddenly to the ground, and in falling, in some way, she does not know exactly how,—*i.e.*, whether by a direct blow or by some wrench or strain,—she injured her left groin. At first it was not known just how she was injured, but within two or three days a lump was discovered in the left groin, which patient states positively had never been there before, basing this upon her mother’s statements subsequently made to her. This lump was promptly recognized as a hernia, and a truss was soon applied. This she wore more or less constantly during childhood. She suffered very little inconvenience from the hernia while a child, and says she was a great romp in her play and very active physically. It was not till about the time of puberty that the swelling began to be troublesome. She then had some pain and tenderness in the groin. The first menstruation occurred at the age of fourteen, and previous to the past five months has always been regular and normal, lasting three days.

She thinks that at times the lump became larger and more

sensitive just before menstrual periods, but this has not been so of late years. It was at all times more or less sensitive to moderate pressure, and previous to the past seven or eight years she has noticed that pressure immediately after the menstrual period was capable of exciting a feeling of sexual desire. Recently this symptom has been absent.

For many years the hernia was, she believes, wholly reducible, and she could wear a truss with comfort; but for eight or ten years past no truss could be endured for many hours at a time, and she was about as uncomfortable with one as without. It has never been strangulated, though she has long been apprehensive that it would be. If she accidentally struck it against any hard substance, as the edge of a table, she would almost faint at times, though she did not feel nausea or the peculiar sickening pain described as caused by pressure on an ovary. She has always suffered much from a constant dragging pain and discomfort, and at times has had attacks of severe pain in the hernia. This has made her very nervous, though, in spite of this annoyance, she has always worked hard in the care of her household, and has never considered herself an invalid.

She was first married at the age of nineteen, and at twenty gave birth to a seven months' female child, weighing only three and three-quarters pounds. At the age of twenty-two she also bore a full-term male child, which weighed six pounds. Both children are now living and in good health.

The course of both pregnancies was perfectly normal, as were also the labors, excepting for the fact that she suffered with each labor-pain so intensely in the hernia that it entirely overshadowed the pains of labor proper, which she hardly felt at all in the usual situations of the back, abdomen, and thighs; and during each labor-pain she was obliged to have the nurse hold and support with her hands the hernia, instead of her back.

Her husband died of phthisis when she was twenty-five years of age. At the age of twenty-nine she contracted a second marriage, and within a few months became pregnant and had an instrumentally-induced abortion at six or eight weeks. This was the first and only abortion or miscarriage she has ever had. She has never been pregnant since, but at times has thought she was, because she had feelings of slight nausea, though she had not missed a menstrual period previous to five months ago.

She had no menstruation in July, 1894; in August and Septem-

ber they were very slight; in October one about as usual; none in November; and only a slight one in December, on the 13th, which was the last one prior to operation.

The only previous treatment has been the wearing of various forms of convex-pad trusses, but the pressure of a truss had long been causing more and more discomfort, and had finally become almost unbearable, so that she was at least no more uncomfortable without one than with, and was anxious to try any means that offered a prospect of relief.

She first came to me on December 21, 1894, wearing an ordinary, convex, water-pad truss.

She is a well-developed, fairly-well nourished woman, apparently in good general health, aside from a considerable degree of nervous irritability, which she ascribes solely to the long-continued annoyance and discomfort of a left inguino-labial hernia, but which, I think, may be due, in part at least, to the approaching climacteric.

In the left labium was a hernial mass of about the size of a small orange, extending upward through the external ring into the inguinal canal, to which straining and coughing imparted a distinct impulse. It was reducible in part only, perhaps half or two-thirds of the mass going upward into the canal or abdomen, while the remainder would not pass beyond the external ring, apparently being either too bulky to enter it or being held by adhesions. To percussion the whole mass was dull, at no point giving any sound of intestinal resonance. The peculiar feature was, however, the form and feel of the extruded substance. In the mass as a whole were two perfectly distinct and separate masses, each of about the size of a large English walnut, and quite hard and firm to palpation. Each was movable within narrow limits independently of the other, but both were evidently loosely connected by some softer tissue. The feel of these masses, but one of them especially, suggested at once to my mind the possibility of a herniated ovary, and I proceeded to attempt by pressure of each in turn to elicit some trace of the peculiar sickening pain or nausea that ovarian pressure causes, but with perfectly negative results. The presence of two such masses also tended to disarm my suspicion and lead me to believe that I had to deal rather with an old, adherent, omental hernia with localized hypertrophies than with so rare a condition as a herniated ovary. Taxis appeared to reduce nearly all of the mass, except these two hard portions which remained external to the external ring and had been simply held against it by the pad of the truss.

In the vaginal examination I was unable by moving the uterus to impart any motion to the hernial mass, though the uterus was quite freely movable, and this again misled me as being additional evidence of some value against its being connected through its ligaments with an ovary, which constituted a portion of the herniated structures. One point, the significance of which I did not at that time, however, grasp, was brought out in the vaginal examination, and that was that the uterus was very markedly inclined to the right, at an angle of about forty-five degrees with the axis of the pelvic canal, the fundus lying against the right side of the brim of the true pelvis, with the canal straight and three and one-quarter inches in length.

Under these conditions there was obviously but one thing to do, and that was to advise a radical operation in the hope, primarily, of obtaining a permanent cure of the hernia, or at least, if that failed, of transforming an irreducible, adherent hernia into a reducible one, for which a truss could be worn with safety and comfort. The only alternative was to have her wear a specially fitted concave pad to hold the irreducible part of the mass against the region of the external ring without exerting injurious pressure upon it. The trusses she had been wearing with the ordinary convex pads were undoubtedly doing her positive harm.

She had had enough of trusses, and eagerly chose the operation. Accordingly she was at once prepared in the usual way for an aseptic abdominal operation, and on December 23, 1894, I operated, expecting to find only an ordinary omental hernia with adhesions, and with only a faint expectation of coming upon an ovary.

The usual incision exposed the sac, which was attached over most of its surface to the surrounding subcutaneous tissues by moderately strong adhesions. These were freed on all sides by blunt dissection as far as the external abdominal ring. The whole of the inguinal canal was now laid open, and the sac freed to a point just within the internal ring. The sac was next opened, and the following puzzling condition of affairs was revealed: A cystic ovary attached by a ligamentous band to a pale-pink, apparently solid mass of tissue; a Fallopian tube with free fimbriated extremity, with its proximal end attached to the same pale-pink mass; a broad, peritoneum-covered mass with two free margins on one side, along one of which ran the Fallopian tube, and along the other the ovarian ligament with its attached ovary, evidently a broad ligament with bifid upper edge; and finally the pinkish mass of tissue, in which the ovarian ligament

and Fallopian tube were lost, situated to the inner side of all the other structures, and having running from it, in the layers of what appeared to be broad ligaments, a flattened, thickened cord or band, about half an inch wide, which disappeared with the broad ligament in the abdominal cavity.

There was no intestine or omentum present. The two small, hard masses previously made out were now exposed to view. One was plainly the ovary; the other the pink solid mass of tissue; but what was this mass anatomically? I at once concluded that it was probably some portion of uterine tissue, either supplementary to the true uterus or an atrophied horn of a uterus bicornis, being influenced thereto, first, by the fact of its appearance and feel, which were those of uterine tissue; second, by the fact that the ovarian ligament and Fallopian tube, which were both of normal length, apparently terminated in it; and third, by the fact before ascertained, but not appreciated, that the true uterus had a very markedly right-sided inclination. The possibility of its being a diverticulum of the bladder also occurred to me, and I determined to cautiously incise the mass before ligating the pedicle. Accordingly, I carefully, by successive slight incisions with my scalpel, cut entirely through the centre of the mass without finding any trace of a cavity. It was solid and apparently muscular throughout. I now felt safe in ligating the pedicle, which was done by pulling it down and transfixing as high up within the internal ring as possible with a double-threaded ligature-carrier, armed with heavy chromicized catgut, and tying it double with interlocking ligatures. I then cut off the mass about one-third of an inch beyond the site of ligation, and dropped the stump into the abdomen; after section I found that the thickened band or cord extending inward from the mass was also perfectly solid, without any trace of a cavity.

All of the sac not adherent to the mass and previously removed with it was excised next. No intestine was seen during the operation, and only one very small mass of omentum showed itself at the internal ring after the mass and its sac had been removed. This was pushed back and the peritoneal opening closed with two fine catgut sutures. The cut edges of the inguinal canal were united by five buried, silk-worm-gut, Halsted, mattress sutures. The resulting everted edges were then overcast by a continuous suture of strong catgut, and finally the skin and subcutaneous tissue were united by continuous catgut suture, leaving only the lower angle of the wound unclosed for one-

fourth of an inch, with three or four strands of catgut in it for drainage. Aseptic dressing of sterilized gauze was applied. Operation occupied one hour, and was conducted aseptically throughout.

The tissues removed presented the following appearances: As a whole, they consisted of a broad sheet of peritoneum-covered tissue, about five and a half by two and a half inches in size, and evidently represented a more or less distorted broad ligament. At the upper and inner portion was a thickened, oval, solid, fleshy mass, apparently muscular in structure, which measured one and one-quarter inches in its longest diameter. Directly continuous with this mass, and running from it to the line of section in a downward and inward direction, was a thickened, solid, cord-like band, of similar character to the mass itself, which measured two inches in length and one-half inch in breadth. From the outer end of the fleshy mass extended in a separate peritoneal fold a narrow, cord-like structure, one inch long, having attached to its outer end an ovary, evidently the ovarian ligament. The ovary was two inches long, and had projecting from its outer end a dark-colored cyst of about the size of a small marble, and several smaller cysts, varying in size from a buck-shot to a large pea, could be either seen projecting from its surface or felt embedded in it. Incision of the largest cyst evacuated about a drachm of thin, port-wine-colored fluid, and showed that, while the projecting portion of the cyst was thin-walled, the inner part had a thick wall of yellowish color and irregular outline that strongly resembled a corpus luteum. Several of the smaller cysts which were incised contained only a clear fluid.

The Fallopian tube was attached to the fleshy mass, close to and anterior to the attachment of the ovarian ligament, but was contained in a separate fold of the broad ligament, in which it extended outward and downward in a slightly convoluted course for a distance of five inches, terminating in a free fimbriated opening, which admitted a probe for four inches.

Along the outer side of the posterior surface of the thickened, solid, cord-like band, lying close to and parallel with it, was a small, cord-like band of tissue, one and a half inches long and three-sixteenths of an inch wide, which was attached to the solid fleshy mass, just posterior to the attachment of the ovarian ligament, and extended downward and inward in the tissues of the broad ligament, becoming less and less distinct, and finally, at a distance of one and a half inches from its origin, no longer traceable. This apparently repre-

sented the remains of the round ligament, but it was much less distinctly characterized than either the ovarian ligament or Fallopian tube.

There was on the posterior surface of the junction of the oval, solid, fleshy mass, with the solid, cord-like, thickened band extending from it, a solid excrescence of about the size of a split-pea, which suggested the possibility of a beginning, tiny, subperitoneal fibromyoma. There were also two small cysts about the size of small peas in the substance of the broad ligament, close to the fimbriated end of the Fallopian tube.

In the line of section of the broad ligament there showed the cut ends of two groups of vessels; one group of two or three lying just to the outer edge of the thickened, solid, cord-like band which extended inward from the fleshy mass, and running with what appeared to be the remains of the round ligament; and the other group of four or five near the outer edge of the broad ligament just internal to the fimbriated extremity of the Fallopian tube.

The mode of origin of the ligaments from the oval, solid, fleshy mass was peculiar in that the ovarian ligament was attached between the Fallopian tube and round ligament, and was supported in a distinct fold of peritoneum; and the Fallopian tube was the most anterior and was also supported in a separate fold of broad ligament, while the round ligament, instead of being as usual the most anterior, was posterior to both.

The report of the histological examination by the pathologist, Dr. W. N. Belcher, of Brooklyn, N. Y., was as follows:

"The mass consists of an ovary and Fallopian tube, presenting nearly the normal relations, together with considerable fibrous, membranous tissue and an elongated mass of reddish-gray tissue beginning at the proximal end of the Fallopian tube and closely resembling muscle tissue. Under the microscope, this tissue is found to consist of smooth muscle-fibres arranged in a manner suggesting uterine tissue. The relations of the specimen are lost to such a degree that it cannot be determined whether or not a uterine canal is present. The normal histological appearance of uterine mucosa was not demonstrated. From these findings it would seem likely that a portion of a deformed or distorted uterus, as well as the ovary and tube, became included in the hernial tumor."

The patient rallied well from the anæsthetic, and suffered no shock. The next day a slight bloody discharge from vagina appeared

and continued for a day or two. The highest point reached by the temperature was 100.5° F. on the second, third, and fourth days, after which it remained between 99° and 100° F. for three days, and subsequently continued between 98° and 99° F.

The pulse never rose above 76, but continued throughout convalescence between 70 and 76. The wound healed *per primam*, and the patient made an uneventful and uninterrupted recovery. She was kept in bed for three weeks, and then allowed to walk about, wearing an abdominal swathe. Normal menstruation of three days began January 29, 1895. She had from the first complete relief from all dragging pain and discomfort; and now, seven weeks after operation, states that she feels better in every way than she ever has before, since her childhood.

CASE II. *Hydronephrosis with Calcification of Cyst-wall.*—J. B., male; aged thirty-nine years; Irish-American; married. Family history negative. Personal history: Was always well up to eight years of age. When eight years old he was riding in the front end of a heavy, four-wheeled ox-wagon, which was empty except for five or six children, and fell to the ground, a distance of about three feet, both wheels of one side of the wagon passing squarely across the lower part of his abdomen, while he was lying on his back. He was unconscious for a few minutes, and then got up alone, and with a hand on the shoulder of another boy walked home, a distance of about half a mile. He stayed in bed for two or three hours, and then got up and played about as usual, wearing a broad bandage about the abdomen for a day or two. He passed no bloody urine, and had no bloody discharge from any outlet at the time or subsequently. No doctor was called to see him, and no evident trouble followed, and he went to school the next day as usual, and continued to do so afterwards. Nothing unusual was noticed for about a year, and then he accidentally discovered in the right iliac region, by pressing with the hand into the abdomen, a hard lump of about the size of a hen's egg, which did not change its size or disappear on change of position, nor was it affected by pressure, coughing, or straining. Then for the first time a doctor was consulted, who ordered a flannel bandage worn about the abdomen and prescribed a liniment. He wore a red flannel bandage for about six years, during which time the lump remained about the same, neither disappearing nor increasing much in size.

When fifteen years old, he went to work in an iron rolling-mill,

and had to do pretty heavy work ; after eight or ten months at this occupation, he noticed that the lump was beginning to get a little larger, but experienced no pain or inconvenience from it.

When eighteen years old, varicose veins appeared in the right leg and thigh, after an attack of swelling and cedema of the whole leg, which developed suddenly, and without obvious cause. He continued working in rolling-mills for eight years, during which time the lump gradually, but steadily, increased in size, always having a hard feel, until finally it projected markedly above the right haunch-bone and towards the right side, and then began, from its size, to inconvenience him about his work, but caused no pain.

When he was twenty-three years old, he fell while working in a rolling-mill, and struck in a sitting posture, shaking up the swelling, and causing some discomfort in it ; twelve hours after the accident he called a doctor, who tapped the swelling with a large trocar, and obtained from it a wooden water-bucket full of clear, yellow fluid, which weighed thirty pounds, and had floating on its surface a glistening scum, which appeared to be oily.

The swelling entirely disappeared after the tapping, and patient could feel no trace of it for the next two or three years. A week after the operation he returned to work in the mill, and worked at this trade for a year longer. He next worked in a bake-shop for six months, and then went to work as a freight-brakeman, and continued this for six years, until he lost his left arm at the shoulder-joint, in a railway accident. For the past eight years he has acted as a "caller" for railway-train crews. Two or three years after the tapping the swelling gradually returned, and continued to slowly and painlessly increase in size for eleven or twelve years ; but during the past two years it has apparently remained stationary.

In March, 1894, a hydrocele of the right tunica vaginalis appeared, and since May 8, 1894, he has had pain in the right sacro-iliac region, which has been gradually growing more severe, and has required opiates to relieve it.

I first saw the patient on April 3, 1894 ; he came to me complaining of dyspepsia, but did not mention his tumor ; the dyspeptic symptoms were relieved in a few days by simple treatment. He again came to me on June 3, 1894, complaining of a dragging pain in the right inguinal and lumbar regions, and said he had a right-sided hydrocele ; in examining this, I first learned of his abdominal tumor, which then presented the following appearance :

In the right iliac region was an irregular, nodular, hard mass, feeling as hard as cartilage, of about the size of a man's fist; directly continuous with this mass, and lying between the crest of the right ilium and the lower borders of the right ribs, filling the whole of the right lumbar region, and extending to the left of the median line in front, was a fluctuating swelling; for three or four inches below the margins of the right ribs in front was a mass the size of a man's hand, which felt as hard as bone, and appeared to have thickened, bony ridges, lying parallel with the long axis of the body. No fluctuation could be detected through this part of the tumor, though it was directly continuous with the fluctuating part below. Its upper portion could be followed up behind the ribs for about three-quarters of an inch, but no sulcus separating it from the liver could be found. The upper limits of percussion dulness of the liver were normal; the resonance over the whole of the tumor was flat, except at its upper and inner portion, and along its inner margin, where intestinal resonance existed. The tumor moved only very slightly on deep inspiration, and was evidently fixed by strong adhesions to all surrounding structures.

All the superficial veins of the right leg and thigh, and those of the right inguinal and gluteal regions were enormously dilated, and tortuous; a few moderately dilated veins existed over the right side of the body, in the axillary line; a large hydrocele of the right tunica vaginalis was also present. No enlarged lymphatic glands could be found in any part of the body. The left arm had been amputated at the shoulder-joint, for a railway injury eight years ago, and there was a sensitive neuroma in the stump.

The patient was slightly built, poorly nourished, and generally below par, physically. The urine was normal in amount, and specific gravity, and contained no albumen or pathological sediment. The heart and lungs showed no evidence of disease. He attributed his pain in the right inguinal region, and a dull, aching pain in the right sacro-iliac region, to the presence of the hydrocele, and had come to me to have that treated. He was told that the hydrocele and the pain were probably results of the tumor pressure, and that he could not expect much relief from treating the hydrocele alone; but at this time he refused to have anything more done, and on June 6 I tapped the hydrocele and evacuated eight ounces of clear, serous fluid, and injected eighty minims of 95 per cent. carbolic acid. This slightly relieved him of the dragging inguinal pain, but the pain in the right sacro-iliac region continued, and became gradually more severe, until

on June 12 he consented to exploratory aspiration, and I withdrew from the most prominent portion of the fluctuating part of the tumor, about two inches inside the right anterior superior spine of the ilium, eight ounces of thin fluid, of the color of black coffee, but in thin layers, by transmitted light, of the color of port wine. This was all that would run through the aspirating needle. Even this small amount lessened the pressure enough to give him a moderate amount of relief from his pain. This fluid was odorless, of neutral reaction, specific gravity 1023, and contained enough albumen to completely solidify on boiling in a test-tube, which was inverted without spilling a drop. Microscopically, I found only decolorized blood-disks, leucocytes, and hæmatin crystals in groups.

After a few days, the pain became as bad as before, and the patient made up his mind to submit to radical operation for removal of as much of the growth as should be found practicable.

Accordingly, after the usual preparations for an aseptic laparotomy, on June 29 I operated by making a two-inch incision in the right iliac region down to the cyst-wall; on opening the peritoneum, I found the great omentum firmly adherent over the cyst; after tearing through this, and exposing the cyst-wall, I introduced the same aspirating trocar that I had used before, and withdrew through it, forty-six ounces of fluid, which weighed three pounds, and had the same appearance and characteristics as that before withdrawn. After this had ceased to flow, I incised the sac-wall for about one and a half inches, cutting with difficulty through a dense, gritty, calcareous tissue, caught the edges of the incised cyst in clamps, and sutured it by a continuous silk suture all around to the cutaneous incision. More fluid of the same kind as that which had been removed by aspiration was evacuated, and upon introducing the finger I found a large quantity of soft, pultaceous material, and the cavity everywhere lined with an apparently rigid, limiting, calcareous wall. I next turned the patient on his left side, and made a three-inch, oblique, lumbar incision, parallel to the last rib and half an inch below it, and came down upon a calcareous surface, too hard for the knife to cut. I broke and forced an opening through this by a blunt instrument, introduced through the abdominal opening, and breaking and twisting and cutting with strong scissors, finally removed several plates of an apparently bony material, about one-sixteenth of an inch in thickness, thus making an opening large enough to permit the introduction of three fingers, and found that they entered a cavity, everywhere lined

by solid, rigid, bony walls, and filled with soft, reddish, pultaceous material, looking more like raw sausage-meat than anything else. This I then shovelled out, using a Hunter vaginal depressor, in exactly the same manner that one would use a spoon to remove the dressing from a stuffed fowl, and without any more difficulty, as it had no connection with the walls of the cyst, but lay loosely in its cavity. The more I dug out the more there seemed to be; my depressor, which was eight and three-quarters inches long, hardly reached the limiting wall in some directions; but finally I had removed, in this way, a quantity that measured over a quart, and weighed three pounds, after straining it from the fluid contents, which came with it; this additional fluid measured thirty-eight ounces, and weighed two pounds and six ounces.

I then had the following remarkable condition: An enormous cavity, with dense stony walls in all directions, which did not collapse, but maintained nearly the original shape and size of the tumor, and gave out a ringing sound when tapped by an instrument. The space normally occupied by the right kidney contained nothing, and no trace of the kidney could be found by three fingers pushed up to the diaphragm through the lumbar incision, or by an exploring instrument passed throughout the entire cavity.

What, from external examination, had appeared to be in part a solid and in part a cystic tumor was, in reality, one large cyst, with its walls stiffened throughout by a deposit of calcareous material of varying thickness and density. Both the lower, nodular part of the tumor, with the feeling of enchondroma, and the upper, bony feeling part, were really hollow, with an extra thick deposit of the calcareous material in their walls, and both were filled with the tightly-packed, soft, pultaceous material of the cyst.

Removal of the cyst-wall was out of the question, for it was firmly bound by strong adhesions to all its surroundings; no attempt to excise it was made. After removing all of the contents that I could, by shovelling it out with my depressor, I flushed the cavity repeatedly, with Thiersch's solution, using several gallons; then stitched in the lumbar incision two large, rubber drainage-tubes, and applied an antiseptic dressing.

The weight of the contents of the cyst, removed at the operation, was eight pounds and six ounces, of which three pounds was soft solid and five pounds and six ounces fluid; these together measured about seven and a half pints, the solid measuring over two pints, and

the liquid five pints and four ounces. To this should be added the eight ounces of fluid first removed by aspiration, which would make the total contents of the cyst eight pints, weighing nine pounds. The time of the operation was a little over an hour; there was practically no loss of blood, and not one ligature was used throughout the entire operation, the only bleeding being from small vessels in the external soft tissues, which were easily controlled by clamp pressure. The patient suffered no shock, and rallied well from the anæsthetic; he had complete relief from his old pain from the time of his recovery from ether. The highest point reached by the temperature was 104° F., on the evening of the fifth day; on the sixth it dropped to 100° F., and afterwards ranged between 99° and 102° F. (Before operation the temperature had been running from 99° to 101° F.) The highest pulse-rate was 104 on the evening of the fifth day, after which it dropped to 80, and continued between 76 and 86. (The sutures were removed on the morning of the fifth day, and at that time the temperature was 101.6° F., and the pulse 96.) The cyst cavity was washed out every two or three days at first, with a 3-per-cent. solution of dioxide of hydrogen, and afterwards with a 1 to 10,000 solution of bichloride and Thiersch's solution. The anterior opening was allowed to contract and close as rapidly as it could, but the posterior one was kept freely open by large, rubber drainage-tubes.

The patient began to improve from the first, and gained color and flesh, and in ten days was sitting up in bed, and in two weeks was out in a chair. The quantity and specific gravity of his urine continued about the same as before operation, averaging about thirty ounces in twenty-four hours, with an average specific gravity of 1022; but two or three days after operation, I found a slight trace of albumen present, and this persisted. (Before operation I had not found albumen, though urine had been frequently examined for it.)

The improvement continued for the first four or five weeks, the cyst gradually, but slowly, shrinking and collapsing, and occasionally exfoliating small portions of its calcareous lining, which were washed out with the irrigating fluids. Then the patient began to fail, losing appetite and strength, and emaciating rapidly.

He soon became too weak to leave his bed, and would probably ultimately have died of exhaustion, if a sudden hæmorrhage into the cyst cavity had not carried him off in less than ten minutes, on August 22, just eight weeks after the operation. There had been, for a week or two before, slight bleeding, when the cavity was irrigated;

and the fatal hæmorrhage occurred immediately after washing out the cavity.

The autopsy, five hours after death, showed the following condition: The cyst was everywhere densely adherent to its surrounding structures, including diaphragm, great omentum, cæcum, ascending and transverse colon, aorta, and right iliac vessels. The cæcum was found adherent to the anterior cyst-wall immediately behind the navel, with the appendix vermiformis adherent, and extending straight down from it behind the linea alba. So intimate were its connections that it took me nearly half an hour of careful dissection to remove it entire.

When removed, it had the general shape of a kidney; it was eleven inches long and six inches broad, with walls half an inch thick, the outer portion fibrous, but the inner surface made up of calcareous material, varying from one-thirty-second to one-sixteenth of an inch in thickness. Its cavity contained a double handful of fresh coagula, and some loosened fragments of the calcareous inner wall. Patches of granulations protruded from its inner surface, at many points between the calcareous plates; its cavity would not contain more than two pints (estimated), whereas it did contain, at the time of operation, eight weeks before, seven and a half pints of fluid and solid material, thus indicating a considerable progress towards obliteration. The empty cyst weighed four and a half pounds, making the total weight of the tumor thirteen and a half pounds.

The left kidney, ureter, and bladder were removed together; the kidney appeared, from external examination, to be healthy, but was much enlarged, being five and a half inches long, three inches broad, and one and three-quarters inches thick; it weighed twelve ounces, —about twice the weight of an average kidney.

There were no enlarged lymphatic glands, internal or superficial.

The post-mortem specimens, together with portions of the fluid and solid contents, removed at the operation, were sent to the Philadelphia Pathological Society, and examined chemically and microscopically by its committee on morbid growths, to whose chairman, Dr. Joseph McFarland, I am indebted for the following report:

Report of Pathologist.—The case is one of hydronephrosis from an undiscoverable and long standing obstruction of the ureter. In the course of time the various trauma to which the part has been subjected, as well as the constantly increasing size of the tumor, have caused the transformation of the distended kidney into a large con-

nective-tissue sac in the most likely parts of which the microscope failed to show a trace of renal tissue. The ureter had been incorporated in the general mass, and, doubtless, long since disappeared.

The interior of the cyst was filled with a turbid fluid, which, however, had a clear straw-color and albuminous nature after depositing a copious precipitate of amorphous salts, cholesterine, and fat-cells and droplets.

The walls of the cyst, which were not very thick, were lined with immense plates of mineral matter, which proved to be phosphate and chloride of calcium when subjected to chemical analysis. In all probability the salts thus deposited were from the stagnant urine which continued to be secreted and reabsorbed long after the ureter was occluded. The process of calcareous infiltration, which is generally observed in morbid processes, differs from this in that the lime salts are deposited in avascular areas from the insufficient oxygen in the body juices. The lime salt, generally met in these cases, is the carbonate, which, of course, is easily recognized with hydrochloric acid.

From the description already given it will be evident that the case is the result of a simple mechanical process and is entirely without malignancy.

It was impracticable to study the condition of the granulations, the possible sources of hæmorrhage. The interior of the cyst was examined very carefully for any gaping vessel, but none could be found. Many such might open in the crevices among the mineral plates, however, and escape detection. It seems most likely that the evacuation of the contents and partial collapse which followed caused some of the sharp edges of the plates to press upon the softer tissue and originate an ulceration which penetrated a good-sized vessel.

The kidney of the other side was hypertrophied from the extra amount of work thrown upon it during all the years since the origin of the disease, and was in an early stage of chronic parenchymatous nephritis.

TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY.

Stated Meeting, February 27, 1895.

The President, ROBERT ABBE, M.D., in the Chair.

SARCOMA OF OVARY IN A GIRL AGED TEN YEARS.

DR. CHARLES MCBURNEY presented a girl, aged ten years, who came under his care the last week in December, 1894. Signs of a tumor had been noticed only three months before, but, doubtless, they had existed for a longer time. On examination the abdomen was found to be occupied very largely by a tumor. It could be felt the entire width of the abdomen and in both loins behind, more especially on the right side, yet also prominently in the left loin, and it extended to just below the umbilicus. The rapidity of the growth, together with the fact that the pelvis was entirely free and the tumor could be pushed still farther away from the pelvis, and the further fact that the greatest prominence was in the right loin, led him to think the case to be one of sarcoma of the right kidney. The presence of a trace of albumen and a few blood-cells in the urine was an indication that the disease was renal.

A lateral incision was first made to facilitate the diagnosis. Both kidneys were found entirely free from disease. It was possible through this incision to reach the pedicle of the tumor, and to determine that the case was a large tumor of the left ovary, mostly solid, but containing a cyst of some size. The pedicle was six inches in length, and as there were no adhesions the operation was readily completed after prolonging the lateral incision downward in the median line. Pathological examination showed that the tumor was a round-cell sarcoma. In reply to an interrogatory Dr. McBurney said that the colon occupied its normal position, but was empty, and had given rise to no resonance.

SACRO-COCCYGEAL DERMOID.

DR. FRANCIS H. MARKOE presented a man, over thirty years of age, who had a tumor of great size developed apparently from the

remains of the neurenteric canal, between the anus and coccyx. It was quite small at birth, but had grown with the growth of the patient, and twelve years ago became ulcerated at one point and increased rapidly in size until it had attained its present immense dimensions. The man was unable to wear trousers or to sit down, had some fever, and there was a constant discharge from the point at which the surface of the tumor had become raw. There was no reason to believe that the tumor communicated with the spinal canal. Dr. Markoe proposed to remove it, but as it had drawn the anus out about two inches lower than the normal situation he queried whether any step would be necessary to anchor and lift the rectum after detaching the tumor. The tumor was probably a sacro-coccygeal "thyroid dermoid" developed from the postanal gut. [The tumor was successfully removed on March 1, 1895. It weighed ten pounds, and was as above described.—F. H. M.]

"SADDLE-BACK NOSE;" ARTIFICIAL BRIDGE.

DR. LEWIS A. STIMSON showed photographs of a man, aged twenty-five, whose nose had been broken a few years ago. He had come to have the deformity, the ordinary "saddle-back nose," relieved, and Dr. Stimson had inserted a canoe-shaped piece of aluminum five-eighths of an inch long, between the skin and bones through a small incision on the ala, thus raising the bridge of the nose to its proper line. The piece of metal healed in very nicely, but as the outline of the nose viewed from in front was not exactly straight, the man returned after a year in order to have this slight defect remedied. Therefore Dr. Stimson removed the piece of aluminum about three weeks ago and inserted in its stead one of gutta-percha, about half as large again. The incision through which it was introduced at the ala was closed by a suture and healed by primary union. The outline of the nose was now slightly aquiline. A few other cases have been treated in a similar manner during the last year, and the cosmetic results have been more satisfactory than those obtained by any other method.

WOUNDS OF THE BLADDER IN OPERATIONS FOR HERNIA.

DR. B. F. CURTIS read a paper on this subject. (See page 631.)

DR. ARPAD G. GERSTER said that he was able to add two cases of injury to the bladder during operations for hernia, both of them

having occurred in 1893. The first patient was a Jewish man of seventy-six years, large, tall, lank, rather flabby, who had a strangulated left inguinal hernia of large size, the strangulation having existed twenty-four hours at the time he was seen by Dr. Gerster, March 1, 1893. Herniotomy was immediately done. After the sac, containing a large portion of omentum and intestine, had been opened, and during dissection of the sac itself, it became evident that there was a second sac filled with liquid along the inner side of the first. Adherent to it were large quantities of light yellow fat. Its close relations with the cord suggested the possibility of its being a hydrocele of the cord. After the fat had been stripped off, the walls of the sac were found to be very attenuated, and Dr. Gerster decided to incise it. He made an incision just large enough to admit his little finger, and immediately a large quantity of yellowish serous fluid escaped, which was not recognized as urine because it had no special odor. But on passing his finger into the sac he followed it up through the inguinal canal into the abdominal cavity, and on turning his finger behind the symphysis he could very distinctly feel the internal orifice of the urethra. Thereupon it appeared very clearly that he had opened the bladder. The viscus was washed out very carefully and the wound in its walls was sewed up in the usual manner by three tiers of very fine catgut. Not being entirely certain that the wound had not been infected, and the man being feeble, he contented himself with deligating the hernial sac at its neck and packing the wound with iodoform gauze, sewing only the upper portion of the wound. A catheter was introduced into the bladder, but the patient was a peculiar and unreasonable old man, and the moment he came from under ether he grabbed the catheter and pulled it out. Notwithstanding this, there was perfect healing, and he was out of bed in ten days, and in due course of time the abdominal wound also healed by granulation, and on the 5th of May a truss was applied, which he has been since wearing with comfort.

The second case was also in a Jewish man, forty-seven years of age, admitted to Mt. Sinai Hospital with strangulated inguinal hernia on the left side. Herniotomy was performed November 14, 1893. Similar relations were found as in the first case, and his previous experience led him to recognize the character of the fluctuating tumor, and the diagnosis was confirmed by the introduction of an instrument into the bladder through the urethra. Thereupon he attempted to dissect away the bladder from the sac, and accidentally tore the blad-

der with the mouse-tooth forceps. The small wound, about a quarter of an inch long, was sutured. It was not an easy matter on account of the extreme thinness of the bladder wall. His intention to do a radical operation, which otherwise would have been perfectly proper as the intestine was in very good condition, was given up, and he contented himself with inserting a catheter into the bottom of the wound, leaving *in situ* that portion of the hernial sac which was adherent to the bladder, as it certainly would have involved more disaster had he dissected it away. A transverse incision was made in order to dissect up and separate the peritoneal lining of the sac. A ligature was then thrown around it, the whole mass was reduced through the inguinal canal, and the upper portion of the wound was sewed. The patient did well for two days. During the course of the third day fever developed, the temperature went up to 105° F., there was considerable abdominal pain and vomiting. Each time the temperature rose above 103° F. the patient had a chill, so that he was fearful that leakage of urine-infection and peritonitis had occurred. On the fifth day, urine began to trickle through the wound. The bottom of the wound was then somewhat dilated with a blunt dilator, the temperature fell to normal, and the man recovered. The leakage through the sinus persisted until the middle of December, after that the wound healed kindly, and the man was discharged, wearing a truss, about the 1st of January.

DR. L. W. HOTCHKISS reported an additional case of wound of the bladder during an operation for inguinal hernia. A man, aged fifty-four years, was admitted to the Bellevue Hospital January 6, 1895, with a left inguinal hernia of eight years' duration.

Examination revealed a complete scrotal hernia of the left side, about the size of a large orange and easily reducible. The hernia had never been strangulated.

January 24, 1895, an operation for radical cure after the method of Bassini was undertaken. The hernial sac was exceedingly thin and its contents at time of operation consisted of omentum only, which was non-adherent and easily reducible. The internal opening of the sac was very large. The sac, having been separated from the cord, was ligated with catgut and cut away. A few sutures were necessary, however, for a tear in peritoneum above the ligature. In separating some of the veins of the spermatic cord preparatory to tying them off, some exceedingly thin tissue on inner side of cord was ligated and cut away. As soon as this was cut through it was

discovered to be a small pouch of exceedingly thin tissue about the length and circumference of a little finger and smooth on its internal surface like a sac of peritoneum. It was thought to be a small peritoneal diverticulum, though the possibility of its being bladder was considered but not thought probable on account of its exceeding thinness. The inguinal canal was closed in the usual manner with deep sutures of catgut and the external wound closed without drainage.

A few hours after operation patient began to complain of great pain over site of operation wound and in lower part and left side of abdomen. This became so severe later that morphine was administered by the house surgeon. During the same evening a few clots of blood were passed per urethram and a little bloody urine withdrawn by catheter. Patient spent a restless night, suffering great pain, which was only partly controlled by morphia. When seen by Dr. Hotchkiss the next morning the patient looked anæmic, face anxious, and pulse small and slightly accelerated. He was in great pain,—temperature 100° F. Examination showed great swelling of the scrotum on the left side and marked discoloration of same by extravasated blood. The penis was retracted, left leg drawn up, and there was pain on pressure over the left side of the abdomen. Suspecting a wound of the bladder a catheter was introduced and a little bloody urine withdrawn. The diagnosis of wound of bladder was made and a secondary operation was done twenty-four hours after the primary operation. The herniotomy wound was reopened and the canal was found full of clots and bloody fluid, the deep sutures having given way. A finger was passed through the internal ring and its withdrawal was followed by a gush of bloody fluid and clots from the peritoneal cavity. The incision was extended upward for about two inches and the peritoneal cavity opened and washed out. The wound in the bladder was then sought for and found to be extraperitoneal, about an inch in length, and with irregular edges. A catheter passed into bladder could be felt through the opening. The bladder did not seem abnormal, but the situation and character of the wound on its side led Dr. Hotchkiss to believe that it had been caused by the snipping off of the diverticulum mentioned at inner side of the cord, and that the ligature proving incompetent the wound had opened and extravasation resulted.

The vesical wound was sutured with catgut and a few silk sutures, the latter being left long as a guide. Injection of bladder with fluid

proving the sutures competent, the abdominal wound was closed except at its lower end, which was packed with gauze, some along the ligature to the site of the bladder wound. For drainage of bladder a catheter was tied in, as patient's condition did not seem to admit of operation for perineal drainage.

During operation stimulants were given freely and an infusion of over a quart of salt solution was injected in the subcutaneous tissue of shoulder. Patient was in profound shock, and rallied slowly only to succumb about nine hours later to œdema of the lungs. He secreted no more urine. His temperature quickly rose to 106° F. just previous to his death. No autopsy.

TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, February 4, 1895.

The President, THOMAS G. MORTON, M.D., in the Chair.

CALCULUS IMPACTED IN THE URETHRA, CAUSING GANGRENE AND RUPTURE OF THE URETHRA.

DR. THOMAS G. MORTON presented a well-grown youth, aged sixteen years, who was admitted into the Pennsylvania Hospital, January 2, 1895, with the following history :

The patient had had irritability of the bladder, and frequent desire to urinate, with occasional stoppages of the flow while urinating. On December 23, after such an experience, the interruption became permanent. On the 26th, as he was in great distress, he consulted a physician, who found a stone impacted in the penile urethra, about two and a half inches from the meatus. In efforts at extraction the stone crumbled to pieces, but it was removed, and the patient states that he then passed about a cupful of blood, but did not empty his bladder. A few hours after the operation the penis and scrotum swelled, forming a tumor which became dark-colored in patches. There was absolute retention of urine. His general condition becoming serious, he was brought to the hospital on the ninth day after impaction had occurred.

When admitted into the hospital he was exceedingly feeble and had septic fever. The penis and scrotum were œdematous and enormously swollen, assuming the form of a dense globular tumor, the size of a large orange; the skin of the penis and scrotum was gangrenous. The bladder was distended to its full extent, and the tumor was the result of extravasation consequent upon rupture of the urethra due to gangrene.

An incision was made in the median line, extending from the penis, through the scrotum, to the perineum, and a large collection

of urine was discovered, which formed the tumor. The incision divided the scrotum in the middle and exposed the urethra, which was gangrenous to the extent of about two inches; the spot where it had ruptured was in front of the scrotum, evidently where the stone had lodged. The perineal urethra was then opened and the bladder evacuated. A drainage-tube was slipped into the bladder from the wound, and a tube was also passed from the meatus. After two weeks both the drainage-tubes were removed. The further progress of the case to recovery was uneventful. The patient, when presented, a month after the operation, had the wound in a healing condition, with the large urethral fistula still open.

Dr. Morton said that he presented the case partly on account of the unusual character of the accident, but more especially in regard to the length of time, nine days, absolute retention existed without bladder rupture.

In regard to the closure of the fistula, it would seem prudent to wait until the repair now progressing shall show what form of operation may be required.

DR. JOHN H. PACKARD thought that the thing to do was to make a perineal section in the membranous portion of the urethra, and keep the anterior portion completely at rest. When repair had gone as far as it would, then an after-operation could be considered.

DR. WILLARD said that the case reminded him of one he saw fifteen or twenty years before. The man, after gonorrhœa, had a stricture, and was in the habit of catheterizing himself. One day urination ceased and retention occurred, as he thought, from the stricture. Dr. Willard first saw him on the fourth day of this condition. At this time the scrotum was gangrenous. The whole anterior portion sloughed off and both testicles were bare. Rupture of the urethra had occurred in the prostatic portion, where a stone had lodged, blocking the urethra and causing gangrene. He treated the case by incision in the perineum and scrotum, removing the stones. The wound healed slowly, but without difficulty, and the man lived several years afterwards. The incision in that case was two or three inches in length, but did not extend as far forward as in Dr. Morton's case.

DR. W. W. KEEN remarked that the most interesting question here was as to the future restoration of the urethra. Two cases that occurred in his practice some years ago had some bearing upon this. One was a patient in the country, who received an injury of his peri-

neum as the result of jumping and coming down upon the sharp corner of a board, which penetrated the perineum to the depth of two or three inches to the prostate and completely lacerated the urethra. He was brought in from the country, and was seen by Dr. Keen on the third day. No urine had been passed. Attempts to make a perineal section were unsuccessful, since the tissues were sloughing and there was such profuse bleeding that the tissues could not be recognized. He therefore opened the bladder above the pubes, and performed retrograde catheterization. A silver catheter was introduced and kept in the urethra for six weeks; the granulation tissue grew around the catheter and restored the urethra completely. Subsequently, by gradual dilatation, the calibre was increased to No. 30, and kept at this by occasional dilatation, by the sound.

The second case occurred two years ago last summer. A man, in vaulting on his bicycle, missed his aim and landed upon his wheel. He ruptured his urethra without breaking the skin. There was complete retention; a perineal section was done, but only after a long search did he succeed in finding the urethra. A catheter was left in for several weeks and resulted in the re-establishing of the calibre of the urethra as in the former patient. It is possible that the same thing might be done in the case of Dr. Morton. If the silver catheter is left in place the granulation-tissue might spring up around it and obviate the necessity of a plastic operation. At all events, it would make a subsequent operation less extensive.

DR. PACKARD said that about fifteen years ago a boy was brought into the Pennsylvania Hospital, who had fallen across a board and caused rupture of the urethra very close to the bladder. In that case there was no sloughing, simply a rupture at the neck of the bladder, just within the sphincter. Attempts had been made to pass the catheter, but without success. Attempts by perineal section to find the vesical extremity of the urethra were unsuccessful. He then performed suprapubic section and retrograde catheterization. He then succeeded in passing a soft instrument through from the penis, and had no further trouble thereafter, and the patient made a good recovery.

DR. HENRY R. WHARTON recalled having seen four cases of impacted urethral calculus. The first was a boy, four or five years of age, under the care of Dr. Lenox Hodge at the Children's Hospital. He was brought in several days after impaction occurred, and sloughing and urinary infiltration existed. He died in the course of a few

days after operation, and it was found at the autopsy that he had typical surgical kidneys. The next case was a child, five or six years of age, a patient of Dr. Samuel Ashhurst. The impaction had only existed for twenty-four hours, and there was no gangrene and no rupture of the urethra. It was found impossible to remove the calculus through the meatus, and an incision was made just behind the stone, and it was taken out. A couple of stitches were used to bring the wound together, but they did not hold well, and the wound healed eventually by granulation. The next case was a man who was brought into the Presbyterian Hospital with retention of urine for twenty-four hours. He had a stone in the urethra at the peno-scrotal junction. He succeeded in grasping the stone with forceps introduced into the urethra, and removed the calculus without difficulty. The patient recovered. The last case was one seen with Dr. Dick. It was a boy four years of age. Retention of urine had existed for twenty-four hours, but he finally passed the stone without operative help, and there was no further trouble. In all the cases seen by him the impaction had occurred at the junction of the penis with the scrotum, which seems a favorite place for the stone to be arrested in its passage.

AMPUTATION OF THE ENTIRE UPPER EXTREMITY (INCLUDING THE CLAVICLE AND SCAPULA) FOR
SARCOMA FOLLOWING FRACTURE
OF THE CLAVICLE.

DR. W. W. KEEN related the following case: E. S., aged twenty-one years, in May, 1893, broke his left collar-bone by a fall. In June, 1894, a tumor appeared at this point, which, together with one and a half inches of the clavicle, was soon afterwards removed by Dr. Stout, of California. The tumor, however, immediately reappeared, and continued to grow rapidly until he came under the care of Dr. Keen in December, 1894. For the previous month he had been under the care of Dr. Coley, of New York, for treatment by the erysipelas and prodigious toxins, but without obvious benefit. When seen there was a large tumor extending from the shoulder to the base of the neck and attached to both clavicle and scapula. It reached to within two inches of the inner end of the clavicle. It seemed to be still possibly operable, because it did not seem to be infiltrating but encapsulated. The tumor seemed to be very movable with the shoulder, and there was not the slightest oedema of the arm, indicat-

ing that the vessels, and especially the veins, were not yet involved. He and his family readily consented to operation. (Fig. 1.)

The tumor was ulcerated at two points, and the skin was brawny and thick. The conditions, therefore, were unfavorable to a thorough asepsis, but the parts were as thoroughly disinfected as possible. His plan was to make one incision at the inner border of the tumor with its centre at the clavicle, and another at a right angle along the line of the clavicle down to the bone, to dissect these flaps, and by drawing away the tumor to uncover as much of the clavicle as possible, removing as much of the inner end as might be, and then search for the vessels. If they could be easily ligated he would then proceed to

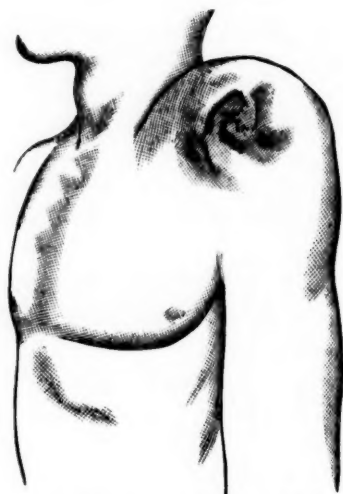


FIG. 1.—Sarcoma of shoulder from fracture of the clavicle. (From a photograph.)

remove the entire upper extremity. If, however, the vessels could not be reached, he would then close the wound and abandon the operation. His temperature was then 100° F. His pain was so severe and constant as to deprive him of much sleep. He was, however, generally in very fair health, though not strong. He was operated on at the Jefferson Medical College Hospital, December 26, 1894. The plan outlined above was carried out. Two and a half inches of the inner end of the clavicle were removed. He then sought for the vessels, and was so fortunate as to be able to dissect them loose and follow them down to the upper border of the pectoralis minor. At no point did he find the tissues under the great pec-

toral involved. In order to tie the vessels at so low a point he had gradually extended his vertical incision nearly to the axilla. It was evident that removing the tumor would remove so large a portion of the skin that it would be impossible to approximate the edges. Accordingly, he carried his incision down on the arm nearly to the elbow and dissected a flap of skin which was healthy from the inside of the arm, to be later turned upward so that the lowest end near the elbow would become the highest when in place on the neck. In dissecting the arm loose he removed the larger part of both the pectoral muscles. The posterior incision was now made, cutting as wide of the tumor as was possible, the incision passing nearly along the posterior border of the scapula. The separation of the extremity was now readily effected, and a moderate number of vessels ligated. After renewed disinfection of the large surface it was closed. The elbow flap was turned upward on the neck and enabled him to cover the entire raw surface by skin without any tension. As the skin of the inner side of the arm near the elbow derived its nourishment, not from the branches of the vessels from the axilla, but lower down from the arm, its transplantation was analogous to skin-grafting, and he regretted afterwards that he had not been very careful to dissect from its inner surface all the fatty tissue, of which only a little, however, was left. At four points he inserted between the stitches small portions of iodoform gauze to act as drains.

The patient was put in bed with apparently little shock, his temperature being 97.6° F., though the operation had lasted nearly two hours. His recovery was rapid and satisfactory, the temperature only rising once to over 100° F. On the sixth day he was out of bed. A small portion of the posterior edge of the flap from the arm sloughed. But for this he would have been entirely well within ten days.

Dr. Keen remarked that in amputations of the entire upper extremity, including the scapula and clavicle, and of the arm at the shoulder-joint, the key of the whole situation is very clearly the control of the hæmorrhage. In the present case operation had been declined by several surgeons on the ground that the disease was too extensive for a successful amputation. He was convinced, however, that the vessels were not yet invaded, because there was no œdema of the arm, and, also, on moving the tumor in various directions it seemed not to be so adherent as to prevent getting under it and obtaining access to the vessels. After resecting the clavicle and tearing through the tissues behind it, it was found possible to drag

the tumor outward, and thus gave an unexpectedly easy access to the vessels.

The branch of the brachial plexus of nerves going to the great pectoral was very easily seen and was a very good guide to the vessels. Each vessel was tied with two ligatures of silk, and the vessel divided between them. The amount of blood lost was not very great, and the shock of the patient was very moderate. He made a most gratifying, uninterrupted recovery.

Dr. Keen stated that this was the second operation of this character that he had done, in both the scar was about the same, although in the former case, a young lady, the tumor was not so large. There was very little shock in either case, although the operation lasted two hours. The first patient was out of bed in five days; the last patient was out of bed in six days. The shock was much less than would be expected from such an extensive dissection. The patient is now in good health. Figure 2 shows his present condition.

ON A MODIFICATION OF THE "INVAGINATION" METHOD OF OPERATING FOR THE RADICAL CURE OF HERNIA.

DR. JOHN H. PACKARD described a new plan by which he believed the hernial canal could be securely and permanently closed in a simple way.

He thought it to be possible to do away with the sac as such without any destruction of its tissues, not eliminating it or laying it open, but simply making use of it, converting part of it into a solid plug, and fastening it into the canal at its inner end, sacrificing nothing. Such invagination of the isolated sac is the essential principle of the procedure which he described.

He recalled a number of invagination methods that were in vogue many years ago. All these methods consisted in pushing up the sac along with a considerable amount of the surrounding tissue; and his belief is that to the want of isolation of the sac, and the consequent drag upon it, many failures in cases at first promising should be attributed.

Some successes were, however, attained. He himself had operated in 1863, by a method substantially that of Wutzer, upon a young man who was desirous of entering the United States navy, but was prevented by the fact that he had a right inguino-scrotal hernia. He afterwards gained his appointment, and three years later was doing duty as a third assistant engineer, the rupture giving him no trouble.



FIG. 2.—Resulting scar after amputation of the entire upper extremity. (The posterior part of the scar is shown in a mirror. Photographed by J. M. Berollet.)

His present plan was to expose the hernia by a curved incision, describing a semicircular flap of ample size. The same incision could be used in operating for strangulated hernia, as it carries the cicatrix away from the seat of trouble, which is afterwards covered in by sound skin.

The sac, being laid bare, is isolated from the external ring down to its tip. Sometimes it is better to empty it during this process, which may often be accomplished by tearing with the fingers. Bassini's advice, to begin the isolation at the ring and to proceed downward, is generally to be followed.

In order to secure control of the empty sac he now passed a silk thread through its wall at either side; the two ends of each are left long, and caught in hæmostatic forceps.

With the forefinger of the left hand the tip of the sac is now inverted and pushed up as far as the internal ring, or as near it as possible.

Next a slightly-curved needle, with an eye near the point, and armed with a thoroughly-sterilized silk thread, is passed up along the finger as a guide, to be pushed out at one side of the tip through the tendon of the external oblique muscle. One end of the thread being caught, the needle is withdrawn slightly, and again pushed through the tendon at the other side of the tip. The other end of the silk thread is now detached from the needle, which is wholly withdrawn, and the two ends, left slack, are caught together in a hæmostatic forceps.

Now, by means of the two lateral threads, and by grasping in the fingers, the doubled sac is drawn down carefully, and with a small curved needle a fine silk suture is passed through it from side to side from below upward as far as possible, and then from above downward, so that its two ends, when drawn tight, will crumple up the sac into a solid mass. These ends are tied and cut off short.

The lateral threads are now removed, and the other silk thread is drawn up tight, pulling the plug formed of the sac into place at the internal ring; its two ends are tied on the outer surface of the tendon of the external oblique, and cut off short. The skin-flap is laid over in place again, the wound closed by sutures, and the ordinary antiseptic dressings applied.

Until the wound is completely healed the patient is kept in bed. He does not put a truss on any of the patients recently subjected to this operation, but cautions them against making any muscular effort likely to bring undue stress upon the parts until time enough has elapsed for their consolidation.

As to the ultimate results of this operation he has no cases of sufficient duration to enable him to speak positively. A man, aged twenty-two years, operated on October 24, was presented for examination; he does full work as an orderly at the Pennsylvania Hospital without either truss or discomfort. A boy, aged twelve years, was operated on December 12. In him there is no sign of yielding of the plug, though he is running about as heedlessly as any boy of his age. A man, aged forty-nine years, operated on at the same time, seems also to be completely relieved. On January 10 he operated on a man, aged fifty-four years, at St. Joseph's Hospital, who has since had a severe bronchitis, but his hernia seems entirely controlled, and he is now going about freely. Another man, aged thirty-two years, in the Pennsylvania Hospital, operated on January 7, is still under treatment.

He said that he was well aware that his array of cases was very small, but the first two above mentioned, and the fourth, afforded pretty severe tests of the efficiency of the closure of the canal. He offered the method as one which seemed to him sound in principle and promising well; moreover, in case of its failure, the parts are in condition for the repetition of this procedure or for the adoption of any other that may commend itself.

Of course, there must be an exercise of judgment as to the suitability of any mode of operation in any given case. There would be difficulty in adopting the one now described in cases of congenital hernia; and whenever for any reason the sac must be extensively opened it would have to be carefully sutured before invaginating it. And he believed that it might not answer well if the canal and internal ring were very wide.

DR. KEEN said that the proposed method did not seem to him to secure the internal ring as well as a suture applied high up and within the internal ring, so as to close it, which he always did. In the second place there was nothing said about suturing the abdominal wall, and without an incision in the abdominal wall it is difficult to locate the internal ring accurately. If this is not closed, there will be left a tube beyond the bite of the ligature. There must also be an opening in the belly wall through which the spermatic cord passes, which is not narrowed in this operation, which would permit recurrence of the hernia. The case presented is too recent to permit any conclusion as to the ultimate result, and in the one of four years' standing the result is unknown. He took exception to Dr. Packard's statement that the Bassini or the Halsted operation is too difficult for

most general practitioners. It does require a good knowledge of anatomy, but unless a man is a good anatomist he should not operate for hernia.

DR. PACKARD rejoined, in reply to the first point, with regard to not closing the internal ring, that in many cases the internal ring is reached if the operator pushes his forefinger as far up as he can, although in some cases where the canal is long one can hardly be perfectly sure that he has reached the end of it. When the ligatures are tightened they draw up the mass which is held in the canal, and make, just at the internal ring, an exceedingly firm plug, which can be felt from the outside for a week or two after the operation, and which gradually subsides. This plug fills up the canal, except the lower portion, which is entirely open, and the dimple behind the peritoneum, where the constituents of the cord come out. Of course, there may be a dimple left at the inguinal ring; but, unless one opens the abdomen and operates from within, one cannot be sure that there is a projection instead of a dimple. The only difficulty is in getting the end of the sac pushed up and suturing it to the internal ring; otherwise it is a very simple operation, and the results have been so far satisfactory. He should be very glad to have it tried by other surgeons.

EXTENSIVE THORACOPLASTY BY SCHEDE'S METHOD.

DR. W. W. KEEN presented a man, aged thirty years, who was admitted to the Jefferson Hospital, March 11, 1894, with the history of a chronic thoracic empyema of twelve years' duration. When admitted, between the sixth and seventh ribs, just to the left of the nipple line, was a drainage-tube which he had worn continuously for nearly eleven years. About half an ounce of pus escaped from it in twenty-four hours. The whole left chest was much sunken in.

March 14, 1894, a vertical incision was made just outside the line of the nipple, and about two inches of the seventh and eighth ribs were resected, exposing the upper surface of the diaphragm. Starting from the opening in the chest cavity, it was with the greatest possible difficulty that Dr. Keen could resect the ribs, since they were absolutely in contact as the result of the deformity of his chest. The pleura was also over an inch in thickness, which made the thickness of the chest-wall about two inches, and therefore very rigid.

In addition to this the left lung was firmly bound down and so contracted that there was practically little lung-tissue in use. Hence, as his respiration was almost confined to the right lung, the ether had

to be watched very carefully, and by the time that he had resected these two ribs it was very evident that the operation should be terminated, and anything further left for a future date.

He left the hospital May 28, 1894, in much better health and with little annoyance from the large cavity remaining in the chest, from which the discharge was comparatively slight. He returned for a second operation June 30, 1894. Examination by a long probe showed that the cavity of the pleura was very large and extended to a level with the clavicle. A vertical incision was made from the clavicle to the still existing opening into the chest cavity, followed

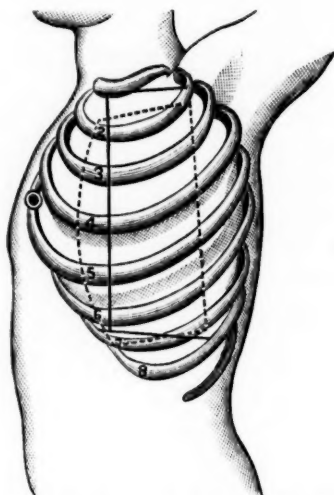


FIG. 3.—The solid line shows the incision. The dotted line shows the portion of the bony and muscular chest-wall removed. The posterior line should be farther back.

by two horizontal incisions at each end of the first. The soft parts were then dissected from the ribs internally to within an inch of the left border of the sternum, and externally to a point an inch posterior to the anterior border of the scapula. Then, by bone forceps, starting from the existing opening, ribs, muscles, pleura, vessels, and nerves—*i.e.*, the entire thickness of the chest-wall up to and including the second rib—were cut; then, starting again from the prior opening outwardly to a point a little in front of the inferior angle of the scapula skirting the upper surface of the diaphragm, then from this point directly upward, and again horizontally on a level with the second

rib. Most of this large mass, on account of its thickness, had to be removed piecemeal, part of it in two or three large pieces. The size of the portion removed was approximately eight inches vertically by five inches horizontally. The inner wall of the cavity was found to be enormously thickened visceral pleura and pericardium, stretching like a vertical diaphragm from front to back at a point about an inch external to the left border of the sternum. This was thoroughly curetted and swabbed. The flaps were then laid directly upon the thickened pleura and pericardium and sutured in place. His recovery was without incident, though slow. The reaction was very moderate.

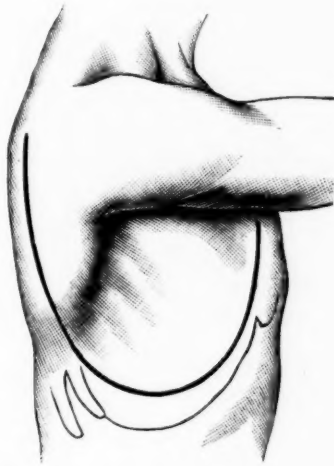


FIG. 4.—Schede's incision for thoracoplasty. (Esmarch.)

His chest is now very much deformed from falling in of the wall, but the cavity is entirely obliterated. His general health is excellent.

Dr. Keen remarked further that this was by far the most extensive resection of the wall of the thorax that he had ever done. The first operation was practically preliminary, simply to gain access to the cavity of the pleura, and had to be terminated somewhat abruptly on account of the difficulty of the etherization. The second operation was attended with less difficulty from the anæsthetic, and was fully carried out.

The operation which he made he had subsequently found had been described by Schede as a modification of Estlander's operation, or rather, perhaps, in suitable cases as a substitute for it. In the

present case Estlander's operation would have been useless, on account of the immensely thickened pleura.

Schede makes a large, semicircular flap (Fig. 4), with its base at the second rib, its curve beginning on the front of the thorax and sweeping downward and backward in a large curve which includes the larger part of one-half of the thorax. In Keen's case the soft parts were dissected from the ribs by a vertical incision with two horizontal incisions at the upper and lower ends of the first, making an [(Fig. 3). It seemed to be equally satisfactory with that of Schede.

The ease with which the operation was done, and the admirable result commend it very strongly. Nothing less radical would have effected a cure. The vessels were controlled without the slightest difficulty by hæmostatic forceps, not even a single one requiring ligation.

His condition (Fig. 5), eight months after the second operation, is curious. The thoracic wall, where its entire thickness has been removed, is as firm and resistant as if the ribs had never been removed. This may be due to two causes: First, the tension of the soft parts of the old chest-wall, which stretch like a drum-head from the anterior to the posterior border of the opening made; second, the thickened pleura and pericardium on the median surface of the old empyemic cavity, furnish a very firm, resistant base on which the flap presumably rests.

The posterior portion of the ribs forms a marked projecting ridge near the posterior axillary line. It looks as if the resections were much less extensive than described, but this is due to a lateral curvature of the spine to the left, thus making the spinal part of the ribs much more prominent than would otherwise be the case. The movements of the arm are perfectly free (Fig. 5), the removal of the greater part of both pectoral muscles having had no restraining effect upon this free shoulder motion.

The apex-beat of the heart is in the normal situation.

He has not gained in weight very much, but his general health is excellent.

NOTE.—A few days after this patient was shown to the Society the wound broke open again and discharged a small quantity of pus. By a third operation some more of the chest-wall at the upper posterior angle was removed. A cavity three and a half inches long and as thick as the thumb was found. This is now (March 27) nearly obliterated by granulation tissue.



FIG. 5.—Result after thoracoplasty. Note the motility of the arm.
(Photographed by J. M. Bertolet.)

THE ADVANTAGES OF AMPUTATION THROUGH THE
KNEE-JOINT AND THE AVOIDANCE OF THE
TOURNIQUET WHEN THE VESSELS
ARE ATHEROMATOUS.

DR. DE FOREST WILLARD called attention to the disadvantages of the use of the tourniquet when the vessels are atheromatous. The constriction causes not only minute fissures in the walls of the vessels, but it may even fracture them, and in either case it tends to develop arteritis, subsequent loss of vitality in the flaps, and secondary gangrene. At the same time the cases presenting this condition are frequently old and feeble persons who are seriously exhausted by the local condition of gangrene, presenting other evidences of obstructed vessels, and can ill afford any loss of blood.

Gangrene occurs most frequently in the feet and legs, and for such condition amputation in the neighborhood of the knee-joint, or at the thigh, is advisable since, after leg amputations, the diseased conditions frequently return.

Amputation through the knee-joint can be performed with less hæmorrhage than at any other portion of the limb, since, in the neighborhood of the knee, all the vessels in front are small and can be readily caught with hæmostats as the anterior skin-flap is cut. The tendo-patellæ, the lateral and posterior ligaments can all be divided without serious hæmorrhage. The limb hangs by the posterior bridge of soft tissues, which bridge contains the large vessels, and these can be easily caught by the fingers of an assistant; in fact, it is now a perfectly simple matter to expose the popliteal artery and to test its pulsation to discover whether it is actually pervious, then to expose it just enough to carry around it a bundle of catgut ligatures, four or five, which ligatures are tied just sufficiently tight to bring the inner coats of the vessels together and not to crush them.

Sometimes the popliteal artery will be found thoroughly plugged, necessitating the working up in the posterior flap for a considerable distance before a pervious vessel will be found.

The popliteal having been tied, the flap is firmly grasped to control the smaller arterial branches, and the posterior flap quickly cut off the desired length. The operation is practically bloodless.

Should the artery be impervious, it may necessitate an amputation higher than the joint itself. The tissues now can be pushed back, the periosteum divided above the condyles, and stripped back

from the femur to the desired distance without loss of blood and without injury to the soft tissues. The femur is then divided opposite the point of ligation and the wound dressed antiseptically.

By thus stripping back the tissues subperiosteally an amputation in the lower third of the thigh can be performed with but little loss of blood and without injury to the vessels by any form of constricting band. It is a plan equally well adapted to traumatic cases with atheromatous vessels.

The knee-joint region should then be the site of election. A broad ligature loosely tied is the best.

INJURIES OF THE LOWER EXTREMITIES REQUIRING AMPUTATION OF THE RIGHT LEG AND EXCI- SION OF THE LEFT OS CALCIS.

DR. H. R. WHARTON presented a man, aged fifty-eight years, who was admitted to the Methodist Hospital in April, 1894, with an extensive compound comminuted fracture of the bones of the right leg, and a lacerated wound of the sole of the left foot with extensive comminution of the os calcis and separation of the attachment of the tendo Achillis.

On the right side an amputation was made through the middle third of the leg, but upon examination of the left foot it was found that a flap consisting of part of the sole of the foot and heel, including the plantar fascia, could be turned forward, although the os calcis was extensively comminuted, and the tendo Achillis was torn loose from its attachment, and its extremity was torn into shreds.

Accordingly Dr. Wharton removed the os calcis completely, and having trimmed off the shreds from the tendo Achillis, sutured it to the posterior portion of the plantar fascia. It was noticed during the operation that all the arteries were very atheromatous.

The patient did well after the operation, and with the exception of a small patch of gangrene which occurred upon one of the flaps of the amputation, and some sloughing of part of the heel of the left foot, which delayed the healing of the wounds, his recovery was uneventful. He was now presented for the purpose of showing how useful a foot he has, even after excision of the os calcis. He walks fairly well; he has a fair range of flexion of the foot. The shoe he finds most satisfactory is one in which the inner portion over the heel is supplied with a triangular pad, to take the place of the prominence normally presented by the posterior portion of the os calcis.

EDITORIAL ARTICLES.

LORENZ ON THE BLOODY REPOSITION OF CONGENITAL HIP-JOINT DISLOCATION.¹

THE first efforts in the direction of the rational treatment of congenital dislocation of the hip were made by Pravaz and Jacquier in 1830. Their efforts were analogous to the treatment of traumatic dislocation, and had as an object the replacing of the dislocated head of the femur into the natural acetabular cavity.

There were two difficulties to be overcome in accomplishing the desired end: the head of the femur, which was dislocated backward and upward, could not in the case of older children be brought down to the level of the acetabulum. The cause of this rested in the shortening of the soft parts, especially the muscles. They sought to overcome this difficulty by mechanical extension. Pravaz obtained unquestionable results in this direction by the use of his persistent and tedious extension appliances. The second difficulty encountered lay in the rudimentary development of the joint-pan, which was entirely too small to receive the head of the femur. All attempts to correct this disproportion of the parts of the joint have been without satisfactory result even up to the most recent time, so that this has still to be regarded as an incurable condition.

Lorenz does not enter into the consideration of the mechanical non-operative methods which have been practised for the correction of this disease; nor does he enter into the numerous operative measures which have been practised with the view of solidly fixing the head of the bone in its pathological position; but devotes himself entirely to the original plan of Pravaz of reducing the dislocated

¹ Sammlung klinischer Vorträge, No. 117, 1895.

head back into a normally located artificial pan. To the Italian, Magary, belongs the credit of first replacing the dislocated bone into the artificially enlarged pan. His effort was unsuccessful, and he resected the head of the femur. The first successful operation was performed by a student of Loreta, in Bologna (Alfonzo Poggi, January 29, 1888), who succeeded in making an acetabulum in the normal location, replacing the head of the thigh-bone and keeping it in position. Poggi found that the obstacle to the bringing down of the head was in the shortened gluteal muscles. His case was that of a twelve-year-old girl. He carried a semicircular incision about the greater trochanter, which extended down to the capsular ligament and divided transversely the gluteal muscles. After splitting open the hour-glass-shaped capsule, the pan was made accessible, and after turning the head out through the wound by strong flexion and adduction of the thigh, the rudimentary pan was artificially deepened. The reposition of the head was then accomplished by strong extension. Thirteen months after the operation there was a good functional result.

Poggi did not elaborate his method, and it remained for Hoffa, of Würzburg, to perfect the operation for replacing the head in its normal position and retaining it as a normal joint.

Hoffa was the first to point out a method for bringing down the head to the level of the pan in all cases, and thereby accomplishing one of the most important conditions in the operation. The construction of an artificial pan, which in itself was no difficult task, and which had been often theretofore accomplished, had to be regarded as wasted pains, because there was no certainty that the head of the bone would remain in it.

The process of theoretical reasoning upon which Hoffa based his method of reduction was to the effect that the muscles about the hip-joint, as a result of the dislocation of the thigh, undergo a nutritive shortening, whereby the obstruction to the reposition is brought about. At the same time he assumed that there is a nutritive contracting of the soft parts, consisting of the long muscles passing from

the pelvis to the thigh and leg. It is upon this ground that he accomplishes reduction by a subperiosteal division of the muscles inserted into the two trochanters.

The theory of the muscular shortening advanced by Hoffa is founded upon the older theory of Brodhurst, which places the cause in the shortening of the pelvi-trochanteric muscles. In virtue of the accentuation of the nutritive shortening of both the pelvi-femoral and pelvi-tibial muscles, Hoffa enlarged upon the old theory of Brodhurst, and constructed a new theory upon which he based his operation.

The operation of Hoffa at the present time is as follows: In children of six years or over the opening of the joint is preceded by subcutaneous or open division of the soft parts on the anterior, inner, and posterior sides of the hip-joint. With the knee extended, and the hip flexed as much as possible, the muscles springing from the tuber ischii are divided subcutaneously. The leg is then brought down and the adductors divided in the same manner. Under strong hyperextension of the hip the soft parts thus rendered tense are divided on the anterior aspect of the joint by an open incision carried down as far as the joint capsule. After these extensive divisions of the soft parts, if any bands still remain tense, they should be cut. These wounds are then protected, and the joint itself opened. This is done by the Langenbeck resection incision, which is carried as nearly as possible parallel with the muscles and vessels, and exposes the posterior surface of the joint capsule. The capsule is opened by an incision parallel to the skin incision. A probe-pointed knife is then passed into the wound, and all of the muscles are separated subperiostially from their insertion into the great trochanter. At the same time the tendon of the ilio-psoas muscle is separated from its insertion into the lesser trochanter, and the whole upper end of the femur, as far below the lesser trochanter as possible, is freed of its soft tissue by means of the raspatorium.

By this means the head of the femur is rendered so movable that with the help of strong flexion and adduction of the leg the entire

denuded end of the bone can be brought out through the wound and held by a strip of iodoform gauze, while the scraping out of the acetabulum is easily practised with the bayonet curette. When the pan is situated at the fundus of the wound cavity the spoon can be guided in by the index-finger. Care should be taken to make the borders of the new pan as sharp as possible.

In the case of young children under five years of age Hoffa omits the preliminary division of the soft tissues described above, and begins the operation by first opening the joint cavity, and then the upper end of the femur is stripped of its muscular connections through the wound. The head of the femur allows itself in these cases to be brought into the acetabulum by direct pressure with flexion of the thigh, and the long muscles are gradually stretched by slow and methodical extension of the knee-joint and hip.

After complete reposition has been accomplished the superfluous portion of the capsule is cut away and the wound stuffed with iodoform gauze. Hoffa places small children upon a Phelps standing-bed; larger children are put up with extension. They are kept in bed for four or six weeks after the operation. After double operations a corset is applied, after single operations a cuirasse splint is used in walking.

At the time of the appearance of the second edition of his textbook, Hoffa had done the operation on fifty-four patients, seventy-five times during a period of five years, forty-four times on both sides, and thirty-one times on one side.

Of these fifty-four patients five died. Two of the deaths were not directly due to the operation, one child dying of influenza-pneumonia fourteen days after the operation, and the other of intestinal catarrh at the end of three weeks.

Three deaths occurred in immediate connection with the operation. Hoffa attributed these deaths to the great loss of blood, operation-shock, the results of prolonged narcosis in cases of unusually long operations, and iodoform intoxication.

Hoffa recommends the bloody reposition only in children before

the tenth year. After this age he recommends, especially in double-sided cases, the formation of a pseudo-arthritis.

A detailed account of all his operated cases has not yet appeared. At the Nineteenth and Twenty-second German Surgical Congress he reported one double and two single cases in which most excellent results were obtained.

M. Schede¹ has reported four cases of bloody reposition of congenital hip-dislocation, and slightly modified Hoffa's method of operating. For the purpose of facilitating the reduction of the head of the femur, Schede recommended extension up to ten pounds for several weeks.

Karewski entertained a very pessimistic view of the results to be obtained in the operative treatment of congenital hip-dislocation especially when a secondary joint had been formed. He endeavored to form a resisting wall by driving nails into the posterior border of the acetabulum and leaving them there for six or eight days.

According to a communication from Joachimsthal,² J. Wolff has had to give up the Hoffa operation and limit himself to simple mechanical treatment.

At the last German Surgical Congress, Twenty-third, there was a very marked dissension on the question. Karewski warned the surgeon against an over-estimation of the operation, especially in cases in which the anatomical conditions were not so favorable as in those cases operated upon by Hoffa and Lorenz.

Von Bergmann recommended the mechanical treatment by splint apparatus, as he had had suppuration in two of his operated cases. Tillmanns had also obtained poor results with the Hoffa method, and attributed the trouble to unfavorable conditions between the neck and shaft of the femur. Only Bramann championed the operation, which he had done in fourteen cases, many of which were severe, with good result.

In France, Hoffa's operation has been followed by Kirrmisson.³

¹ Langenbeck's Archiv, 1892.

² Berliner klinische Wochenschrift, 1891, No. 15.

³ Revue d'Orthopédie, March, 1893.

His results are not very encouraging. Among seven of his operations is but one satisfactory result. Scarcely any were without reaction; there was a pronounced local disturbance in three cases; and one death resulted twenty-six hours after operation from shock, hæmorrhage, or septic peritonitis.

From these experiences Kirmisson has come to regard Hoffa's operation as a very serious thing. In every case he perforated the pelvis while scooping out the acetabular pan, and thus greatly increased the danger of the operation.

Lorenz himself has hesitated a long time over the operation of Hoffa, and has performed it but once, upon a seven-year-old girl.¹ In that case it was shown that the head of the femur, even after the greatest possible denuding of the upper end of the bone, could only by very great traction be moved from its pathological situation.

Lorenz assumed, from this experience, that the soft parts inserted into the greater and lesser trochanters and in the intertrochanteric space, as well as the pelvi-trochanteric muscles, acted in nowise as an obstruction to the drawing down of the head of the femur, as Hoffa believes. To prove this, Lorenz shows that with the pelvis fixed when extension is made upon the dislocated leg the soft parts over the larger trochanter, as far as can be determined by palpation, remain relaxed and are evidently no obstruction to the reposition of the head of the bone.

By a closer study of the myopathology of congenital hip-joint dislocation, Lorenz has evolved certain principles.² These are briefly as follows:

(1) The pelvi-trochanteric muscles (*glutæus medius, minimus, pyriformis, obturator internus, gemelli, obturator externus, quadratus femoris, and ilio-psoas*) do not undergo a shortening in congenital dislocation of the hip, but, on the contrary, they became elongated, and, therefore, do not offer any obstacle to the drawing down of the head of the bone.

¹ *Centralblatt für Chirurgie*, 1892, No. 31.

² *Wiener klinische Wochenschrift*, 1894, Nos. 11-13.

(2) The pelvi-femoral muscles (*glutæus maximus* and the adductor group) undergo a general shortening. This shortening really involves only the median portion of the adductor magnus and in a lesser degree the adductor longus, which are inserted into the lower end of the diaphysis of the femur, while all the other fibres of the adductor group undergo an elongation.

(3) The pelvi-crural muscles (*sartorius*, *tensor fasciæ latæ*, *rectus cruris*, the other anterior muscles, *gracilis* on the inner side, and the three muscles inserted into the *tuber ossis ischii*, *semimembranosus*, *semitendinosus*, and *biceps femoris* on the posterior side of the thigh) undergo a shortening in ratio with the degree of the dislocation of the femoral head, and form the only muscular obstruction to reduction of any importance.

Lorenz based a plan of operation upon these pathologico-anatomical facts, which he first carried into effect in May, 1892, in the clinic of Professor Albert. Soon after this he published a report¹ of the method based upon four cases.

The principle of his method of reduction rests, contrary to Hoffa's method, in the unconditional preservation of the muscles inserted into the larger and smaller trochanters.

The division of the pelvi-trochanteric muscles he considers superfluous, for, by virtue of their lengthening, they do not prevent reduction, and their division from their attachment does a lasting damage to the function of the muscles, and is an entirely unnecessary procedure. Of all the muscles about the hip-joint the pelvi-trochanteric are more protected from atrophy in congenital dislocation, on account of the dragging upon them of the weight of the body, than are the pelvi-femoral and pelvi-crural muscles. A most perfectly normal action of the pelvi-trochanteric muscles in the intact hip-joint is of the utmost importance for a normal gait, for they perform the function of holding the pelvis firmly against the femur when it is supporting the weight of the body.

An imperfect fixation of the pelvis against the supporting femur

¹ *Centralblatt für Chirurgie*, 1892, No. 31.

would in all cases give rise to a more pronounced sinking of that side of the pelvis. At the moment of stepping on the right leg, supposing an insufficiency of the right pelvi-trochanteric muscles, the left half of the pelvis would be abnormally strongly depressed.

In case of hip-luxation the abnormally-strong contralateral depression of the pelvis during the act of bearing the body-weight on the diseased leg is a very characteristic feature of the peculiar gait, and contributes to the impression of general sinking of the whole body when the dislocated leg is stepped upon. After complete reduction of the head this symptom remains. The children which are operated upon, and in whom a perfectly satisfactory reduction has been accomplished, still have a limping gait. This persistent limp remains so long as the insufficiency of the pelvi-trochanteric muscles cannot be remedied.

The preserving intact of the pelvi-trochanteric muscles is, therefore, a chief desideratum in all operative therapy, in cases, also, in which these muscles are contracted. Their division should not be practised even when they are shortened. Their preservation becomes more important with the degree of defect in the gait.

Further pursuit of this idea shows that conjointly with the preservation of the pelvi-trochanteric muscles the preservation of all the other hip-joint muscles is indispensable for arriving at the best results.

In severe cases the flexor muscles must be preserved under all circumstances, in order not to impair the later flexing function, and to avoid the tendency to flexure contracture.

Furthermore, Lorenz insists that in children six and seven years of age and over, with more than three centimetres of irreducible shortening, an absolute immunity must be given to the tuberosity muscles, notwithstanding their contracting, out of consideration to the ischiadic nerve.

The disregarding of this rule has in many such cases, with constant regularity, been the cause of neuralgias of the ischiadic, and, indeed, of paralysis of the leg.

It can be positively asserted that the paralysis of the muscles of

the foot, after tenotomy of the ham-strings, is in nowise due to injury to the nerves, but is the result of dragging upon the ischiadic nerve, which is done by the extension of the leg after division of the tendons. By preserving the tuberosity muscles intact and practising gradual extension, the ischiadic nerve is not subjected to the danger of sudden stretching, and the desired result can be accomplished with absolute certainty.

It is an interesting fact that in the beginning of his operative repositions Lorenz had no disturbances of the ischiadic nerve after separating the ham-string muscles from their attachment to the ischium. This is evidently preferable to cutting the tendons behind the knee, as Hoffa recommends. This is explained by the simple fact that in the high operation the continuity of the muscles attached to the ischium is not entirely destroyed, some fibres still remaining, and thus the great sciatic nerve does not entirely lose its muscular protection. In young children with slight and non-resisting shortening, the tenotomy of the posterior thigh muscles does not cause any disturbance in the ischiadic nerve wherever it is done; and in these cases it is *eo ipso* unnecessary.

It has been Lorenz's endeavor during the last two and a half years to do away as much as possible with the division of muscles in the 140 cases in which such operation might have been practised, and finally he has arrived at his present method of reduction, which is characterized by the absolute preservation of the continuity of the muscles.

Lorenz divides the cases into three classes:

(1) Those in which the head of the femur can be easily brought down into the pan of the acetabulum in children from three to five years of age.

(2) Cases of moderate severity in children from six to eight years.

(3) The more severe cases between nine and twelve years and upward.

(1) In the lightest cases an assistant grasps the dislocated leg

above the knee and makes moderate extension with the leg slightly abducted without any contra-extension against the perineum. An incision six to eight centimetres long is carried from the anterior superior spine of the ilium along the outer border of the tensor fasciæ muscle downward and outward. The fascia lata is divided from the spine downward along the outer border of the tensor fasciæ muscle, backward along the anterior border of the glutæus medius muscle, and the tensor fasciæ latæ with the overlying sartorius and the underlying rectus cruris are drawn forward. The anterior capsule of the joint is then exposed by blunt dissection. The transverse separation of the fascia lata from the wound outward allows the head to be brought down by moderately strong extension. The capsule is then divided, the pan gouged out, and the head repositied. This is practically what is done also in the more severe cases.

In this operation the head is reduced into its normal place without cutting a single muscle about the hip-joint.

(2) In cases of the second class, in which the ordinary methods of extension do not bring the head down into place, the same principle of preservation of the muscles is to be observed.

The anterior capsule is exposed in the same manner as above described. As an aid to reduction, Lorenz uses in this class of cases a band thrown around the leg, upon which two assistants make extension in a slightly abducted direction, while counter-extension is made by a perineal band. The capsule is then opened and the head drawn down to its normal level.

Lorenz uses in especially difficult cases a screw arrangement at the foot of the table around which the extension bandage is passed, and traction is made by gradually winding up the bandage which is fixed about the leg. In using such an apparatus it is important that the extension be made very gradually. By this means it is possible to accomplish reposition in severe cases without dividing a muscle.

(3) In cases of the third category, with marked shortening and very slight downward movability of the head, it is necessary to precede the operation by a period of treatment with extension. This

may be accomplished by an extension of thirty pounds for not more than fourteen days.

The effect of this is often not very evident, and the chief work has to be done at the time of operation with the extension screw. Lorenz has been able to manage the most difficult cases in this manner without sacrificing a muscle.

As soon as reduction is accomplished the capsule is opened by a liberal cross incision. One arm of the cross reaches from the spina ilii anterior inferior to about the middle of the linea intertrochanterica anterior, and corresponds with the direction of the neck of the femur. The other arm of the cross is nearly at right angles to the first, and extends from the region of the front inner border of the rudimentary pan to above the level of the upper pole of the head of the femur. The ligamentum teres should be extirpated.

The opening of the joint is followed by the gouging out of the pan. In order to render the pan more accessible the head is lifted out of the way by slight flexion, abduction, and elevation of the femur, while the anterior muscles (tensor, sartorius, rectus, and ilio-psoas) are strongly retracted inward by a blunt retractor.

Through this opening the rudimentary pan is reached by the index-finger along which a sharp spoon is guided, and the cartilaginous floor of the same is scraped out. The *modus procedendi*, of course, varies with the case, but the idea is to make as deep and normally shaped an excavation as possible to receive and retain the dislocated head. Herein lies the art and the difficulty of the whole operation.

Great pains must be taken to make a good excavation and a sharp upper border to the same. As the act of cutting out the pan is a very bloody operation, it is advised, when both sides are operated upon at one sitting, to make the operation as rapidly as possible. A perforation of the wall of the pelvis in making the pan is, as a rule, entirely unnecessary.

When a satisfactory acetabulum has been made, the last act of the operation follows,—namely, the reposition of the head of the femur

into the artificial pan. When it has been found beforehand that the head can be brought down to the proper level, there is usually no difficulty encountered in fitting it into the new cavity by simple extension, provided that no tissue falls between to prevent reduction. As a rule, it is necessary to make some little improvements in the pan after testing the fit of the head in it, until the head fits firmly in its new cavity. The operation may be regarded as satisfactory when the bone remains in place with the leg lying out straight, or when it is slightly adducted.

The capsule should be brought together, but not sewed. The skin wound, with the exception of a small central point, is then closed with sutures. Aseptic dressing is applied, and the leg is fixed in a position of light abduction by a plaster bandage extending from the axilla to the malleoli.

In the case of young children, Lorenz has completed the entire operation in from ten to fifteen minutes. Double-sided luxations in young children from four to seven years of age he corrects at one sitting. The plaster bandage in such cases is made to include both legs, which are lightly abducted.

The after-treatment consists in the absolute rest of the muscles and joint. On the fifth or sixth day the children are usually allowed out of bed. An elevation can be placed under the sound foot. On the tenth day the dressing is renewed. In the course of the fourth week the entire fixation bandage is removed, and the wound which should be nothing more than a superficial granulation is simply protected with a gauze bandage. Gymnastics and massage of the leg are then begun. The gymnastics consists in very careful and slight passive flexion, extension, and abduction of the leg, and their combinations. The movements of abduction and the massage of the muscles of the buttock are of the greatest importance. When it is seen how quickly these children regain the use of their legs, the value of preserving the muscles is very evident. In the sixth week the patient is, as a rule, able to walk alone or with the assistance of another. Lorenz has entirely given up every sort of apparatus for after-treatment.

If the head of the femur is in fairly good condition, and the reposition has been exact, a backward relaxation need not be feared; for such an accident is prevented by the overhanging border of the pan, the scar and the air-pressure, and the abducted position of the thigh during healing, strongly prevents such an accident.

Great care should be taken to prevent subsequent contracture malposition. Especially is the tendency to flexo-adduction to be guarded against by strong, passive motion in the opposite directions. The further treatment consists in energetic walking without assistance.

This operation, of course, gives the best chances when done during the first ten years of the child's life. In cases in which the head of the femur is in good condition the operation can be carried out in adolescence. The oldest patient operated upon by Lorenz was twenty years of age. As a limit for the double-sided operation he fixes the age of ten years.

As to the results to be attained by this operation, a completely normal function of the joint, the absolute integrity of the joint-parts, and the joint-musculature is to be expected. In the strict sense of the word, this is not completely accomplished. It is clear that the newly-constructed joint, by virtue of the incongruence in the two coapted parts, the imperfection of the pan, the distortion of the femoral head and neck, the misfit capsule, etc., is only an imperfect substitute for the normal hip-joint.

In the course of further use these conditions become improved. The surface of the pan becomes covered, as Hoffa has shown, with a layer of fibro-cartilaginous tissue, whereby the motion between the head and the pan is more smooth, and there is a better congruence between the two. The capsule also becomes more normal, so that an excursion of 90° can be made in an antero-posterior plane, and a satisfactory abduction can be accomplished. On account of the deformity of the upper end of the femur and danger of relaxation, any increase in the excursion of the leg should not be striven for. A nearly normal anatomical condition of the joint is possible if the limits of motion are thus confined.

However perfect in an anatomical sense, the result of the operation may be a perfect functional result, as shown in a regular and normal gait, is not to be expected. Notwithstanding a perfect reposition, the gait of the child remains usually a limping one. This limp, however, has a very different character from the luxation limp, and is due to the imperfect fixation by the muscles at the moment the weight comes upon the affected side.

The functional result of the reposition is, therefore, finally dependent upon the degree of muscular insufficiency, and this explains why the gait remains so long imperfect. This fact emphasizes the necessity for preserving the muscles, and especially those of the pelvi-trochanteric group.

Of course, after the reposition, it cannot be expected that the legs will be of equal length, because of the shortening from the anomalous growth of the upper end of the femur. The shortening can vary from a few millimetres to two centimetres,—rarely more. This can easily be remedied by a lift under the foot.

When, as a result of the reposition-operation, complete ankylosis of the hip-joint occurs, it is a fact that it is possible for the functional result, as shown in the gait of the child, to be incomparably better than with a movable joint with muscular insufficiency.

Lorenz gives a summary of the first hundred cases operated upon by him after his method since May, 1892. The cases can be divided into two groups, as they were treated under entirely different circumstances. The first twelve cases constitute a group which were operated upon by Lorenz in Albert's clinic. These operations were done while the operation was still in an experimental stage, and under conditions very unfavorable for asepsis. As a result there was an uninterrupted series of bad results. One reposition was left unfinished because of the imperfection of the technique. (This case was operated upon twenty-seven months later, when the child was thirteen years old, and a perfect result obtained without dividing a muscle.) In another case suppuration with subsequent luxation took place. The first double-sided case operated upon developed mild suppuration in

both sides, with subsequent ankylosis of both hips, in a slightly flexed position. Relaxation occurred in two cases as a result of pathological anteversion of the femoral head. Once the reposition was very difficult, because the upper end of the femur resembled very much that of the humerus, and was only possible under strong abduction. The result in three cases was bad, because after-treatment could not be carried out. This list of bad results was finally followed by two cases which, after perfectly smooth operations, died, one after another, from very acute sepsis.

With such results Lorenz could not continue his work in the clinic of Albert, and so he moved the seat of his operations to the private hospital of Dr. Eder. Here he did his first hundred repositions without a single death. The cases, with but a single exception, healed without reaction; and in this case, though ankylosis occurred, an excellent gait was the result. In three other cases, notwithstanding uncomplicated healing, the motion in the operated joints was very limited, and the results were only fairly good.

The question as to whether the head always remains in its place, Lorenz is able to answer from his experience that only in two operated cases, as a result of a too tardy correction of adduction, did a posterior relaxation of the thigh take place.

Out of the 100 cases of reposition, in eleven cases a relaxation of the head forward under the anterior superior spine of the ilium was observed. This condition always occurred very early during the period of healing of the wound. In these cases there was always a pathological anteversion of the head of the thigh-bone, and the relaxation is to be regarded as a necessary mechanical result of this condition. Cases of this sort had better be excluded from operative interference entirely.

The anterior dislocation is not to be regarded as a complete failure of the operation, for with the head on the anterior border of the wing of the pelvis beneath the spina ilium anterior superior it has a bony support, which gives it a stationary position, and greatly improves the limping gait.

With these thirteen cases excluded, all of the others have fulfilled as nearly as possible the possibilities of the operation. The complete cure of the limp must depend on the measure of the restoration of the muscular strength. This is quite entirely a question of muscular restitution. Lorenz has always observed that the slight limp after the operation in all cases becomes less month after month; and in every child which was submitted to operation, between one and two years of age, the limp is reduced to such a minimal degree that it is quite impossible to tell upon which leg the operation was done. Such cases were presented by Lorenz before the K. K. Gesellschaft der Aerzte in Wien, and the Surgical Section of the Thirteenth International Congress in Rome. He presented a series of thirty-four operated children, of whom five were double-sided cases, before the Surgical Section of the sixty-sixth *Versammlung deutscher Naturforscher und Aerzte* in Wien, and the results were highly complimented.

Lorenz expresses his satisfaction that he has been able to demonstrate upon a mass of material, which for size and richness has as yet not been equalled, that the congenital hip-joint dislocation is accessible to an operation which is practically without danger, and which, under favorable anatomical conditions, promises an almost complete cure of the disease.

Hoffa has repeatedly alluded to the method of Lorenz as a modification of his operation. This is certainly not the case. The theoretical foundation of Hoffa's operation rests upon the idea that the muscles are contracted, especially the pelvi-trochanteric group, and that there is a general shortening of all of the muscles about the joint.

The method of Lorenz, on the other hand, is founded upon the fact that pelvi-trochanteric muscles are lengthened, and therefore cannot be a hinderance to reduction, and on this ground and on the ground of their functional importance must not be divided. The only muscles, according to Lorenz, which are shortened and which hinder reduction are the pelvi-crural and, partially, the pelvi-femoral muscles. The basis of Hoffa's method is not only very different from

that of Lorenz, but in a large part of its pathologico-anatomical principles is diametrically different. This is seen in the practical application of the two methods.

The preservation of the insertion of the pelvi-trochanteric muscles necessitates the anterior opening of the joint in Lorenz's method, while the supposed necessity of division of all of these muscles in Hoffa's method makes the resection-incision of Langenbeck necessary.

Hoffa's method is characterized by denuding the upper end of the femur of its muscular attachments; Lorenz's method by the absolute preservation of all of the muscles inserted into the upper end of the femur. Another difference between the two methods is that Hoffa, in severe cases, does not spare any of the muscles which move the hip-joint.

In order to show more clearly the difference between the two methods the following figures may be consulted: In a mild case, in a child under five years of age, Hoffa sacrifices, under all circumstances, at least ten muscular insertions, while Lorenz does not divide a single muscle. In considering the question of muscular division, then, the relation of the method of Lorenz to the method of Hoffa is 0:10. In a double-sided case this relation would become 0:20.

If we take, for example, a very difficult case of the third category (a nine to twelve-year-old child), the method of Lorenz accomplishes a reduction of the head with the division of not more than two adductor muscles, whereas the method of Hoffa would sacrifice not less than eighteen muscles. With the exception of the middle adductor group, Hoffa would sacrifice every muscle connecting the leg with the pelvis. In such a case the muscle-preservation ratio would be 2:18; and in such a double case, 4:36.

Another difference between the two methods is in the act of opening the capsule. Hoffa's method costs the capsule its femoral insertion; the method of Lorenz leaves the insertion of the capsule completely intact and opens the joint by simply splitting the capsule.

A further difference between the two operations is the extent of operative division of tissues. In this the operations differ widely.

This fact is of great importance, for upon the extent of injury to the tissues depends the immediate danger of the operation. Inasmuch as the reposition of the congenital hip-dislocation belongs to the cosmetic operations, the greater or lesser danger of the operation is a very important moment.

Up to the present time the literature contains reports of four deaths, which occurred immediately at the close of Hoffa's operation from shock, acute anæmia, long duration of narcosis, intoxication from antiseptics, etc. Hoffa himself had, in seventy-five operations, three deaths immediately after the operation.

A very different picture is that of Lorenz's operations, done at the private hospital of Dr. Eder, in Vienna, which, out of 100 operated cases, shows no deaths and ninety-nine healing without reaction. On the ground of these facts Lorenz claims that under aseptic precautions his operation may be said to be without danger.

As a student under Lorenz, it was the privilege of the writer to witness his early struggles with congenital hip-joint dislocation. Any better results than he obtained in his first twelve cases operated upon in Albert's clinic, would have been nothing short of marvellous. The wonder was that he dared to venture upon such grave operations surrounded by such unfavorable conditions as prevailed in Albert's cramped quarters at that time. Since 1892, the operations which he has been able to do in Eder's operating-room, show that the early failures were not wholly due to faults in the technique.

JAMES P. WARBASSE.

REVIEWS OF BOOKS.

TEXT-BOOK OF ABDOMINAL SURGERY. A Clinical Manual for Practitioners and Students. By SKENE KEITH, F.R.C.S., Ed.; assisted by GEORGE E. KEITH, M.B., C.M. Philadelphia: J. B. Lippincott Company, 1894.

The book is the work of two sons of Dr. James Keith. The object of the book, as learned from the preface, is to present a systematic treatise on abdominal surgery as practised at the present day. They do not propose making an extensive compilation, but have depended more particularly upon their own experience and observation.

The book is divided into two parts, general abdominal surgery and abdominal surgery peculiar to women. The first chapters deal with the methods of making an abdominal examination, and go at length into the different kinds of abdominal tumors, with their diagnosis and differential diagnosis. Reckless exploratory incision is condemned most severely.

The preparation for an abdominal operation is made delightfully easy. The operation is done preferably at the patient's house. There need be no taking up of carpets or preliminary house-cleaning. The pubes of the patient need not be shaved, and the skin requires no preparation beyond washing with soap and water, followed by bichloride solution just before operating. Ordinarily prepared catgut is used, and the sponges are prepared by washing them thoroughly in soda solution after the previous operation and putting them in a solution of carbolic acid. The operation is performed through a hole in a rubber sheet. The edges of the hole are smeared with a kind of adhesive plaster, so that they will stick to the patient.

Ether is given in preference to chloroform, *because it produces less vomiting.*

The after-treatment is gone into at length, and is one of the most valuable chapters in the book. Stress is laid on the importance of intestinal paresis and the modes of preventing and treating it.

The rest of the book is divided into chapters, each dealing with the surgery of a certain region. The general plan of one of these chapters is to give a short abstract of the anatomy of the region from Quain's "Anatomy;" mention a few of the surgical diseases, with their diagnosis, differential diagnosis, and symptoms; and give a description of a few of the commoner operations.

The chapter on the stomach is noticeable for the vagueness of its descriptions, the absence of illustrative diagrams, and the evident lack of experience by the authors in the procedures described.

The chapter on the intestines describes at length the various kinds of obstruction, following Treves very closely; and then takes up the commoner operations. Circular enterorrhaphy is done with a continuous suture, and ten minutes is considered ample time. Colotomy and the other operations are described briefly after the usual methods. The chapters on the liver and kidneys present practically what is found in all of our general text-books.

Part II takes up the subject of gynæcological abdominal surgery. Each subject is illustrated with interesting cases, mostly from the service of the elder Keith, in which the minor details from the bedside notes are recorded in full.

Apostoli's method of treating fibromyomata is praised most highly and excellent results from its use are reported.

In the closing chapters on major obstetrical operations the authors are very evidently writing about a subject in which they have had no experience. The chapter on symphyseotomy consists of an abstract from an early paper by Harris, of Philadelphia. Laparo-elytotomy is given as the preferable operation for removing a child from the uterus, although Thomas, the originator of the operation and its chief advocate, has long since given it up and declared himself in favor of Cæsarean section.

Some of the omissions of the book are a little surprising. Murphy's buttons are not mentioned. The ureters are dismissed by saying that if cut the ends should be sewed together, if possible, otherwise the kidney should be extirpated. Cholecystenterorrhaphy is not mentioned except as a procedure to cure a biliary fistula; and Alexander's operation is omitted entirely, retroversion being treated by removing an ovary and suturing the stump into the abdominal wound.

Another surprising feature is the etiological importance attributed to a chill. In the beginning chapters we are told to keep the patient warm while being tapped so that he does not "catch a chill" that may be followed by acute peritonitis. In other places we find a chill given as a direct cause of pyonephrosis, appendicitis, acute peritonitis, salpingitis, and suppuration of an ovarian cyst; and, at least, a predisposing cause of tubercular nephritis. After once having had an attack of appendicitis, the patient should be advised to wear a bandage the rest of his life to prevent having a chill.

But little use has been made of the recent literature in preparing the book. The illustrations are few, and consist mostly of anatomical diagrams and instruments. The descriptions of the operations are vague and lacking in detail. Usually only one method of doing an operation is given, and that often is not the best one.

On the whole, the book cannot be accepted as an adequate exposition of the present state of knowledge and practice in the field which it essays to cover. Its chief value lies in the information which it gives of the opinions and methods of the authors, and indirectly of their distinguished father, from whom the younger men have presumably derived their inspiration.

GEORGE R. WHITE.

ANTISEPSIS AND ANTISEPTICS. By CHARLES MILTON BUCHANAN, M.D. 12mo, pp. 352. Newark, N. J.: The Terhune Company, 1895.

In this little book is found an excellent summary of our present knowledge of antiseptics in the treatment of wounds. Beginning with a very good historical review of antiseptics in wound treatment,

there follows a brief discussion of the subjects of infection, susceptibility, and immunity. Then is presented a description of antiseptic agents proper, being a series of paragraphs in which every substance, in alphabetical order, for which any antiseptic power has been claimed is mentioned, more or less at length. The list is a bewilderingly long one, numbering 209 articles in all. Boracic and carbolic acids receive the most favorable mention; the use of corrosive sublimate is discouraged and its value is very much discounted. As the reader progresses in the examination of this list, he comes finally to one which, according to the representations of the author, combines properties which make it superior to any other of the long list. It is a proprietary compound which can be obtained only from a certain enterprising firm of Western drug manufacturers. The real inwardness of this book is now patent. In the later chapters of the book, in which the special value of antiseptics in medicine, surgery, and obstetrics is set forth, the special virtues of this compound become again the subject of commendation. The order is this: antiseptics are valuable; antiseptic powders are especially valuable; the ——— powder is the most valuable. It is greatly to be regretted that so evident an advertisement of a special proprietary preparation as this book is should have been able to command the co-operation of reputable surgeons.

L. S. PILCHER.

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EDITED BY

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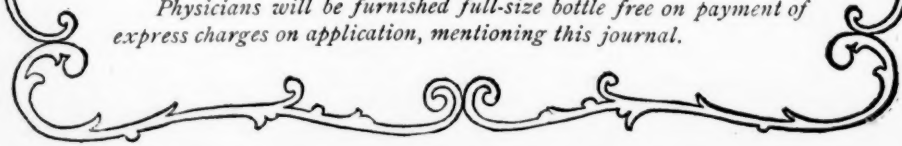
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